Evaluation of competitive intelligence software for MSC-status small and medium-sized enterprises in Malaysia

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Evaluation of Competitive Intelligence Software for MSC-Status Small and Medium-Sized Enterprises in Malaysia

By

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A doctoral thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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ABSTRACT

Small and medium-sized enterprises (SMEs) in Malaysia, particularly in the information and communications technology (ICT) sector, are faced with an increasingly volatile environment. The Malaysian business scene has opened up their markets to the world where smaller businesses find themselves competing with newly launched multinational subsidiary and subdivision companies, along with the large local firms. The Malaysian Government has launched several campaigns and support for smaller local businesses to be more competitive and to continuously compete at par with these larger companies. This research project supports the Malaysian Government’s objective of instilling a more structured approach towards a more competitive SME by focusing on the management of competitive information related to these companies.

In recognising the rising need for competitive support, management and executives are increasingly relying on a concept called Competitive Intelligence (CI), a systematic and ethical process for gathering, analysing, and managing information that can affect a company's plans, decisions, and operation. In managing competitive information, several companies have emerged especially to develop online tools and software that would enhance the CI process and the value competitive intelligence brings to organisations. The success of these CI software tools depends, however, on the sophistication of an organisation's understanding of the CI process and scope of usage. Different companies derive different values from different approaches to competitive intelligence, and therefore require a flexible tool that is very specific to the company’s needs. Therefore, this research investigated the structures and contexts of Malaysian Small and Medium-sized Enterprises (SMEs) based on competitive intelligence (CI) concepts to derive a more customised approach to the use of CI for SMEs in the ICT sector, as well as in the selection of appropriate CI software.

Mintzberg’s approaches to analysing organisational structures and contexts, Bouthillier and Shearer’s Intelligence Cycle, Herring’s Key Intelligence Topics, and Davis’ concept of effectiveness were used in two main stages. The first stage involved identifying the nature and range of SMEs, which exist under Malaysia's Multimedia Super Corridor, a government benchmarking body for local businesses. This gives an account, on the basis of cluster analysis, of a taxonomy of SME categories consisted of ten clusters. The relationships between the categories were also examined in the first stage of the research. The relationships and clusters found in the first part of the research offered the basis for the second part of the research, which constructs the
criteria for evaluating online tools and software for competitive intelligence. The evaluation criteria are then used to evaluate eight CI-ready software packages in finding suitable tools for the different categories of SMEs. Finally, the research concludes with a study of the prospective users' perceptions of effectiveness in SMEs drawn from the identified clusters. This 'multiple constituency' approach to understanding effectiveness evaluates both Davis' concept of effectiveness (usefulness), as well as the differential evaluations of perceived effectiveness.

The research findings provide evidence of a range of SME structures in a variety of contexts. Levels of importance placed on different levels in the CI process are identified, as well as aspects that need support, automation and/or augmentation. The software evaluation in the second part of the research provided ten recommendations of suitable software package(s) for each SME cluster. However, an initial review by SME managers of perceived effectiveness mostly did not reveal results that were parallel to the findings from the software evaluation study. All in all, the research confirms that SMEs can be analysed by clusters but further research would be necessary to confirm the effectiveness of using the recommended CI software over a longer period of time.

**Keywords:** Competitive intelligence (CI), Small and Medium-sized Enterprises (SMEs), Information and Communications Technology (ICT), Malaysia, CI software, perceived effectiveness, taxonomy, Key Intelligence Topics (KITs), Intelligence Cycle.
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LIST OF ABBREVIATIONS

BI Business Intelligence
C3SR Command, Control, Communications, Computers, Surveillance, and Reconnaissance
CEO Chief Executive Officer
CGC Credit Guarantee Corporation
CI Competitive Intelligence
CILIP Chartered Institute of Library and Information Professionals
CIN Critical Intelligence Needs
CNN Cable News Network
CRM Customer Relationship Management
CTO Chief Technology Officer
DCF Discounted Cash Flow
EIS Economic Information System
GDP Gross Domestic Product
GFY Government Fiscal Year
HCI Human-Computer Interaction
HTML Hypertext Markup Language
HTTP Hypertext Transfer Protocol
ICA Industrial Coordination Act
ICT Information and Communications Technology
IP Internet Protocol
ISO International Organization for Standardization
ISP Internet Service Provider
ISTIC Institute of Science and Technical Information of China
IT Information Technology
JCIM Journal of Competitive Intelligence and Management
JETRO Japan External Trade Organization
KIQ Key Intelligence Questions
KIT Key Intelligence Topics
KM Knowledge Management
LAN Local Area Network
MARA Majlis Amanah Rakyat (National Trust of People)
MDC Multimedia Development Corporation
METI  Ministry of Economy, Trade and Culture
MITI  Ministry of International Trade and Industry
MNC  Multinational Companies
MSC  Multimedia Super Corridor
PDA  Personal Digital Assistant
RAM  Random Access Memory
RPC  Remote Procedure Call
SCIP  Society of Competitive Intelligence Professionals
SES  Spontaneous Environmental Scanning
SKATE  SCIP Knowledge Analysis Team on Ethics
SME  Small and Medium-sized Enterprises
SOAP  Simple Object Access Protocol
SED  Small-scale Enterprises Division
STIS  Scientific and Technical Information-Intelligence System
SWOT  Strength, Weaknesses, Opportunities and Threats
TAM  Technology Acceptance Model
UNIDO  United Nations Industrial Development Organization
XML  Extensible Markup Language
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Chapter 1
Introduction

1.1 Introduction

Advancements in information technology during the last two decades have drastically changed the field of business intelligence\(^1\). The act of conducting competitive research is now an entirely new, and some may argue, an enhanced process. The diffusion of technology and information has resulted in not only major changes in speed at which intelligence can be gathered, but it has further multiplied the volume of information that is available and whose quality is subjective. The emergence of the Internet and online databases offers the intelligence profession an almost inexhaustible supply of information. In many cases, the information is so massive that the problem for the researcher is one of deciding how to filter and to manage competitive information\(^2\).

In realising the problems of managing competitive information, several companies have emerged especially to develop software that would enhance the CI process and the value competitive intelligence brings to organisations. The success of these tools depends, however, on the sophistication of an organisation’s CI process and scope of usage. According to Bouthillier and Shearer, different companies derive different values from different approaches to competitive intelligence, and therefore require a flexible tool that is very specific to the company’s needs\(^3\). The authors also suggests the need for comprehensive research to derive specific contexts and needs of organisations for use in constructing a more customised approach to evaluating CI software, one which considers specific organisational needs in terms of the CI process. The thesis reports the findings of a research that aimed to achieve this, in the context of Small and Medium-Sized Enterprises (SMEs) within the MSC-status Information and Communications Technology (ICT) sector in Malaysia.

\[^{2}\text{Ibid., p. 6.}\]
A CI software study conducted by Fuld & Company stressed that "technology cannot drive process, but help in workflow and efficiency", and stresses that "CI is chiefly a human process". This report concluded that a considerable portion of the CI process still requires a strong human component. Many publications on CI are synonymous with the perception that 'analysis' is the most important activity in the CI process, but due to the qualitative nature of the information gathered, there is not much software can do in processing the information to create intelligence. Although it is agreed that technology will not be able to analyse qualitative information fully, CI software can greatly help in automating the once very time-consuming process of collecting information, and in organising relevant information much more efficiently and speedily. Therefore, the survey conducted by Fuld & Company concluded that CI technology will continue to increase in demand.

From a review of some preliminary information from publications about CI software for this research, it appeared that classifying the available software for competitive intelligence may be more subjective than was expected. This is because many of the current business applications, although not designed for the CI practice, do have many elements that help put competitor information into CI perspective. One example is a product called RetrievalWare, a software solution based on the more traditional Knowledge Management framework. According to Mark Demers of Excalibur Technologies Corporation, now known as Convera, RetrievalWare is used fairly widely within CI applications because it does have varied degrees of focus on processes relating to CI, which, in this case, aim to give a better understanding of business rivals that potentially threaten a firm's market position. WebQL and C-4-U Scout, applications from Caesius Software Inc. and C-4-U Ltd. respectively, both appeared in Fuld & Company's Intelligence Software Report 2002, are recognised and reviewed as viable tools for supplementing the CI process, though not originally designed for CI practice. Other software applications may claim to promote themselves as business intelligence applications, although 'business

4 Ibid.
5 Ibid.
intelligence may seem related, it usually refers to data warehousing and quantitative analysis, rather than activities relating to competitive intelligence which are more qualitative in nature.  

Even though the demand for CI capability continues to increase, the usability of these software products that are CI specific seem to still be in transition. These products are being released into a market where CI roles and functions are extremely specialised and very dependant upon organisational processes and structure. Therefore, there is inefficiency in choosing the right product that would be suitable to the requirements of a company. Due to such technological and conceptual uncertainties of the CI field, there is a need to establish specific intelligence needs within different classifications of organisations as a framework for developing methods to evaluate CI software products, particularly for businesses that are smaller in structure.

Research and case studies pertaining to large organisations and their involvement in CI are quite accessible, some in forms of collected publications, such as Prescott and Miller's Proven Strategies in Competitive Intelligence, Blenkhorn and Fleisher's Competitive Intelligence and Global Issues and Fleisher and Blenkhorn's Controversies in Competitive Intelligence. In effect, CI has to some extent positioned itself as a practice for large organisations. Publications on CI seem to produce concepts that are mostly applicable to what has become a typical organisational structure for CI practice, whereas CI is just as critical to other smaller organisational endeavours. The point is that the bulk of CI study has been concentrated on large organisations despite the fact that the majority of organisations are small. In Malaysia, at the start of 2005, firms with less than 200 employees accounted for more than 89 per cent of all businesses, represented 60 per cent of business employment, and 58 per cent of turnover. Small and medium enterprises have been widely known as an important source of employment and

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economic development\textsuperscript{16}. According to the Small-scale Enterprises Division, a Division under Malaysia's Ministry of International Trade and Industry (MITI), small and medium-size enterprises (SMEs) demonstrate the greatest job creation during economic downturns and contribute the most to job growth during economic expansions\textsuperscript{17}.

Malaysian SMEs, like many SMEs worldwide, face unique issues with regard to gathering reliable competitive intelligence and analysing it for incorporation into their strategy and objectives. It is due to these unique issues that many standardised CI concepts may be difficult to apply to SME processes. Most SMEs seek less standardised, often less recurring approaches to different situations and problems. On the other hand, some companies, especially the older and the larger SMEs, may share some characteristics with their large and generally bureaucratic company counterparts. Thus, if there are to be conceptual contributions in augmenting CI use for SMEs, there may need to be a range or a taxonomy of SME configurations, rather than one standardised concept, as in the case of large companies.

Finally, SMEs often have less means to undertake extensive research on competitive environments, and are hence possibly less capable of keeping abreast with its constant changes compared to their larger counterparts. Thus, an important aspect of CI gathering processes at SMEs is organising for speed and simplicity using accessible information resources without sacrificing efficiency. This raises the question of whether SMEs would benefit from using simple and more accessible software tools and resources to help gather relevant competitive intelligence. Further, it inversely relates to the question of whether current CI software could realistically be used by the average SME, that is, one with limited resources of time, capital and knowledge.

It is within this context that an evaluation was made of the structures and contexts of Malaysian SMEs, their intelligence needs, the types and functions of CI software available and appropriate for SMEs, and effectiveness of the software to these companies. The concepts used as basis for this research were introduced and critically reviewed in the three literature review chapters that follow.


The relationships and clusters reported in the first part of the thesis offered the basis for the second part of the thesis, which constructed the criteria for evaluating online tools and software for competitive intelligence. The evaluation criteria were then used to evaluate eight packages in finding suitable tools for the different categories of SMEs. Finally, the research concluded with a study of the prospective users' perceptions of effectiveness in SMEs drawn from the identified clusters. This 'multiple constituency' approach to understanding perceived effectiveness evaluated two aspects of effectiveness, as well as the differential evaluations of perceived effectiveness.

The findings provided evidence of a range of SME structures in a variety of contexts. Levels of importance placed on different levels in the CI process were identified, as well as aspects that need support, automation and/or augmentation. The software evaluation in the second part of the research provided ten recommendations of suitable software package(s) for each SME cluster. However, an initial review by SME managers of perceived effectiveness mostly did not reveal results that were parallel to the findings from the software evaluation study. Overall, the research confirms that SMEs can be analysed by clusters but further research would be necessary to confirm the effectiveness of using the recommended CI software over a longer period of time. Figure 1.1 provided an overview of the research undertaken.

1.2 The Research Project

Generally, this research project consisted of two main stages which sought to investigate software for competitive intelligence for use in small and medium-sized business enterprises. The first stage was to identify the structural and environmental characteristics of selected SMEs in Malaysia, and their intelligence needs towards establishing a taxonomy of "competitive intelligence configurations" for SMEs. The second stage identified and evaluated CI software packages that were accessible to SMEs and relevant to these intelligence configurations. The recommendations made were then tested to address the perceived effectiveness of the selected CI technology tools, and differential evaluations of perceived effectiveness (levels of perceived effectiveness) among different users or levels of users within the companies.

The project sought to identify the structural and contextual characteristics of selected SMEs in Malaysia, and their key intelligence needs, identify CI software that was within the boundaries of these companies, assess it through a variety of intelligence processes, and evaluate perceptions of
its effectiveness in a variety of circumstances. Thus, stage one dealt primarily with structural and environmental characteristics of selected companies, and their intelligence needs, which partly illustrated the boundaries related to their current competitive strategies. This progressed towards identifying the multiple conceptual models that make up the intelligence configurations taxonomy, which was used to guide the identification and evaluation of CI software in the second stage of this research. During the second stage, the evaluation study of the software sought to a) establish whether the functions and capabilities of the selected CI software would be consonant with the key intelligence needs, contexts, and structures of the companies and b) explore aspects of its adoption. Following the software evaluation, a feedback study was employed on potential users in SMEs drawn from the companies identified during stage one. This part of the research sought to examine a) the perceived differences in effectiveness of the proposed CI software tools among the diverse contexts and processes of SMEs identified within the taxonomy and b) the overall effectiveness in adopting the proposed CI software in SMEs. A ‘multiple-constituency’ approach to understanding effectiveness was used to evaluate the effectiveness of the CI software among different clusters or reference groups within the specific SMEs.

As the research progressed through the stages, it was planned for parts of the research to be published and disseminated by means of conference papers and journal articles. The purpose of presenting and publishing in conferences and academic journals was to put forth data and new knowledge from the research within the CI field and so, seek validation from the field’s scholarly reviewers of its originality and reliability. This approach also guided the researcher in terms of direction and helped improve the methodology over the course of the PhD.

1.2.1 Aims and Objectives

The research agenda of the evaluation of CI software for SMEs for each of the two empirical stages is outlined and defined below in terms of aims and objectives of the research. Along with the research aims and objectives, a brief discussion of the anticipated findings for both stages is provided here.

1.2.1.1 Aim 1 To develop a Taxonomy of Competitive Intelligence Configurations for SMEs

The first research aim sought to identify structural and environmental characteristics, as well the intelligence needs of SMEs, and construct a taxonomy of CI configurations, which refers to a
model that translates the arrangement of structures, contexts, and intelligence needs arranged by categories of SMEs. The objectives formulated to inform the analysis of structures, contexts and intelligence needs, are the following:

1. To define the structures and contexts or environments within which SMEs operate.
2. To define the SMEs' key intelligence needs in terms of strategic actions, technology planning and decisions, and specific competitors.
3. To define the SMEs' software preferences based on the six phases of the CI process.
4. To identify homogeneity amongst the companies in terms of the preferences in the different phases of the CI process, their key intelligence needs and their structural and contextual features by way of cluster analysis.
5. To determine the relationships between the clusters of companies and construct a taxonomy of competitive intelligence configurations derived from the companies' relationships with the CI process, their structural and environmental characteristics, and key intelligence needs of SMEs.

Based on the above aim and objectives, the following two hypotheses were developed.

(1) **The relationship between Malaysian SMEs in the ICT sector and their structures and contexts**

The SMEs under study will reveal a variety of structures and contexts.

(2) **The relationships between Malaysian SMEs in the ICT sector in terms of the CI process and structural and contextual characteristics**

Homogeneous characteristics amongst the SMEs can be derived and categorised into clusters based on their value-added preferences to the six phases of the Intelligence Cycle (CI process), their structures and contexts, and key intelligence needs.

Based on preliminary documentary research, several general assumptions were made on structures and contexts of SMEs. Primarily, it was anticipated that the structural analysis of SMEs would reveal a variety of structures within the companies that may react differently to similar contexts and intelligence needs, and/or that SME contexts and intelligence needs would vary from one company to another. Additionally, it should be noted that for this research project, the SMEs ranged from small entrepreneurial endeavours to companies of 200 employees. Although it has been concluded several times in literature that SMEs are structurally entrepreneurial, or *ad hoc*, or
both, the range in the number of employees, as well as other contextual determinants, such as specialisations, the company's technological structure, resource accessibility, and research capability, are characteristics that differentiate one SME to another in terms of approaches to individual tasks, particularly CI tasks. Therefore, further research anticipated relationships were as follows:

- The entrepreneurial SME were anticipated to be negatively associated with the number of employees, specialisations, and technological structure.
- The *ad hoc* SME, it was hypothesised, would positively be associated with specialisations.
- The SME that is both entrepreneurial and *ad hoc* was expected to exhibit positive associations with specialisation, but negative associations with number of employees.
- As for contextual relationships, the number of employees in SMEs, it was assumed, would be positively associated with specialisations, technological structure, resource accessibility, and research capability.
- Lastly, resource accessibility was assumed to have positive associations with research capability and technological structure.

The reasoning underlying these anticipated relationships was as follows:

- The entrepreneurial SME by definition has few staff, loose division of labour, hence, less specialisation, and little or no technostructure.
- On the other hand, *ad hoc* SMEs tend to group employees into functional units to be deployed in small project teams, hence greater specialisations.
- SMEs that are both *ad hoc* and entrepreneurial usually have few staff but these staff are also usually highly specialised.
- The SMEs that have a larger number of employees are divided into functional units, which increase specialisations; and, have greater access to resources, hence a more complex technological structure and better research capability.
- Finally, SMEs with greater access to resources are likely to have better research capabilities, as well as a more complex technological structure.

Other findings associated the structural and contextual features with the SMEs' value-added preferences to the CI process.

The outcomes of the proceeding interview dialogues were combined and regrouped with the above findings to develop the configurations taxonomy of intelligence software needs for SMEs, which provided the variety of approaches to different intelligence needs of SMEs in relation to their structural and contextual features, and the CI process. This multiple approach model was to provide the requirements and focus to conduct effective identification and evaluation of appropriate software tools for competitive intelligence, as well as a guide to evaluate perceptions of effectiveness in the use of these tools in SMEs.

1.2.1.2 Aim 2 To Evaluate and Test the CI Software and Online Tools for SMEs

Having identified the intelligence configurations of SMEs, the second aim of the research proceeded to identify and evaluate software tools for CI that were in accordance to the requirements and contexts of the proposed taxonomy. Specifically, it sought to address the following objectives:

1. To identify the range of CI software packages that is suitable for SMEs.
2. To define the features and functions of the selected CI software.
3. To identify the capabilities of the selected CI software in adding value to the six phases of the CI process.
4. To identify and evaluate the relationships between the software functions with the boundaries and requirements of SMEs identified within the competitive intelligence configurations taxonomy.
5. To make recommendations on suitable CI software packages based on the structures, contexts, key intelligence needs, and focuses on the CI process of each SME group or cluster.
6. To test the overall perceived effectiveness of the recommended CI software packages to prospective users that represent each SME group or cluster.
7. To identify the differences in perceptions of effectiveness between prospective users of different levels or job scopes.

8. To validate the consistency of the overall findings of the research based on the respondents’ perceived effectiveness of CI software.

According to Clay Prince, it is important to distinguish between a technology that will enable the business processes from the people who will make a well-designed business-process work\(^{22}\). Hence, this second stage of the study sought to establish a) the range of CI software tools that was likely to be suitable for SMEs in general (covering Objectives 1, 2, and 3), b) the level of consonance between structural and contextual features identified, key intelligence needs and preferences in the Cl process, with the functions of CI software tools (covering Objective 4), c) the CI software that was likely to be suitable for different relationships of structures, contexts, and key intelligence needs and the CI process of Malaysian SMEs in the ICT sector (covering Objective 5), and d) generally attain feedback from selected groups of prospective users on their perceived effectiveness of the CI software recommended to them (covering Objectives 6, 7, and 8).

The purpose of Objectives 6, 7, and 8 was to evaluate a) whether the suggested CI software tools were perceived as it would operate effectively in the small and medium-size enterprises, b) whether there were differential perceptions of effectiveness between the different levels in employees within a specific SME and finally, c) to verify the consistency of the results achieved, the taxonomy developed and the CI software evaluated. The ‘multiple constituency’ approach to understanding effectiveness evaluated the CI software effectiveness for SMEs as well as the differential perceptions of effectiveness in specific SMEs. This approach allowed the gathering of data from different groups of respondents in different contexts, specifically the grouping of respondents by level of seniority within each company. It was therefore anticipated that employees from different levels of the SME workforce under study would score differently in the way they perceived the effectiveness of the software tools. It was also anticipated that the proposed CI software would be effective overall in complementing the approaches to CI tasks in small and medium size enterprises. Hence, based on Objectives 6, 7, and 8, these broad anticipations in the results provided for the following two hypotheses:

(3) The relationship between different levels of staff and management of the SMEs and the variables of perceived effectiveness

Employees at the senior and middle management and lower level staff from within each SME under study will react differently in terms of the way they perceive the effectiveness of the recommended CI software to their scope of work.

(4) **The relationship between the SME clusters and the variables of perceived effectiveness**

Respondents from each industry cluster will react positively towards the recommended CI software.

The aims, objectives and hypotheses in this research guided the two stages of the evaluation of CI software for SMEs, and the findings were gathered, analysed and evaluated further in this thesis. In addition, implications for the design of the intelligence configurations taxonomy, the software evaluation design, and the perception of effectiveness evaluation design are discussed, as are further implications of SMEs. The following Figure 1.1 presents an overview of the research stages and activities: 23 24 25 26 27 28 29

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Year 1: Preliminary research on competitive intelligence and literature study were conducted. Parts of the preliminary study involved a field study on the Malaysian government's SME-related initiatives and policies, and backgrounds of MSC-status SMEs in the ICT industry in Malaysia.

The literature study covered aspects of CI theory, its origins, practices, policies, and ethics. Implications of CI in SMEs in literature were also studied. More relative to the research, previously applied methods of software evaluation in for CI software were also gathered and analysed.

The preliminary research and literature study allowed the construction of aims and objectives, research instruments and research methodology.

First Year Report was presented. Three papers presented and published based on this report.

### Aim 1: To develop a Taxonomy of Competitive Intelligence Configurations for SMEs

#### Stage 1: The Survey

**Year 2: Questionnaire**
- Pilot: 33 respondents from management participated during SME Conference and Exhibition 2004.
- Data gathering: 270 respondents out of 680 questionnaires sent to management (response rate: 39.7%).
- Breakdown:
  - 57 – Software developers
  - 38 – Production and design
  - 18 – Telecommunications
  - 25 – Content developers
  - 20 – Education and training
  - 21 – Hardware/Electronics design
  - 8 – Systems security
  - 18 – Systems integration
  - 23 – Mobile and wireless technologies
  - 29 – Shared services

**Year 2: Interview and Results**
- Pilot: 10 respondents participated during SME Conference and Exhibition 2004.
- Data Gathering: 12 interviews were conducted. Respondents were chosen to represent 10 clusters (sub-industries) of companies (shown on left).
- Breakdown: Respondents were managers, senior managers, directors, CEOs, a CTO, and a Managing Director.

Based on the results of questionnaires and interviews, hypotheses proven that the SMEs can generally be categorised into clusters based on structures, contexts, CI process and key intelligence needs and the Taxonomy of CI Configurations for SMEs was developed.

Second Year Report was presented. Two papers presented and published based on this report.

### Aim 2: To Evaluate and Test the CI Software and Online Tools for SMEs

#### Stage 2: The Software Evaluation

**Year 3: Software Evaluation**
- SCIP 2006 was attended to collect CI software demos and contacts.
- Total eight CI software were evaluated using ten evaluation frameworks constructed based on the ten configurations from the Taxonomy.
- Software recommendations were made to suit the needs of the ten SME clusters.

**Year 3: Perceived Effectiveness Study**
- The software recommendations were presented to participants of various job scopes and levels from the ten clusters.
- A questionnaire based on Davis' TAM model to study perceived effectiveness was developed and distributed to 24 participants.
- Findings showed mixed views.

Draft of Dissertation was submitted to Supervisor and Director of Research. Amendments were recommended. Two additional papers were presented and published based on the dissertation.

PhD Final Draft Completed

Figure 1.1 Research Overview
1.3 Structure of the Thesis

This chapter has provided a structured rationale and the description of the two stage project. The aims of the research project were discussed and its description was provided by reference to the two empirical stages.

Chapters 2, 3, and 4 review the literature. Chapter 2 focused on defining and understanding the field of competitive intelligence, its origins, the processes, and a general view of the CI practice. Chapter 3 reviewed the generic literature on issues of SMEs in Malaysia and its involvements in information technology in general. Software tools for use in competitive intelligence and its incorporation with current approaches and practices by SMEs, are subsequently discussed in Chapter 4.

Chapter 5 described the theoretical and methodological approaches adopted in this project. The process of data collection and choice of research tools were also discussed along with issues of validity of methods and measures, and reliability of data.

Chapter 6 reported the results of Aim One of the research project.

Chapter 7 reported the results of Aim Two of the research project.

Chapter 8 concluded the thesis with discussions on the contributions of the overall research, its limitations, and prospects for future research.
Chapter 2
Literature Review I
Competitive Intelligence: A Conceptual Overview

2.1 Introduction

This chapter reviews literature on competitive intelligence, discussing general issues to gather a fair understanding of the field. Divided into four sections, the first section builds a case for the existence of CI and the perceived benefits, followed by a study of definitions. The second section reviews literature from different aspects of history, discovering the first signs of intelligence practice to the more recent involvements in business. After a critical review of intelligence practices in history, the third section of the chapter begins the review of current practices in CI, covering different CI processes and Key Intelligence Topics were used in the research methodology to identify the values placed within different phases of the CI process, and to help simulate SME environments during the software evaluation process, respectively. The fourth section covers previous work relating to typologies and taxonomies in the context of CI.

2.2 Building a Case for CI

The business need for different types and depth of information or intelligence has been a constant to varying degrees. Such intelligence is more than just a good idea for a given circumstance; it became a necessary component for any competitive situation. As such, CI now appears to have enough conceptual developments and practical, historical, and empirical support to stand on its own. According to Walle, the field has developed its own traditions, methods, and universe of discourse. The implication of the need for specifically generating Competitive Intelligence (CI) is not new. Various trends indicate that CI is becoming an increasingly important component for

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a successful business paradigm. The benefits of successfully anticipating a competitor's future plans and strategies are generally self-evident. It is all too obvious that the consequences of making decisions based on information that is incomplete, inaccurate, or late are not less than severe.

In the world of commerce, this intelligence-gathering goes on every day, without necessarily called by its rightful name. Any employee who visits a trade show, reads a newspaper, or talks to friends in the same industry is doing research (one of the components of CI). The prominence of intelligence-gathering functions is growing with the awareness and incidences of capitalising on the global platform. Competition has intensified dramatically over the last decades, in virtually all parts of the world. Increasingly, management strategists are relying on CI. Competitive intelligence as a crucial organisational process has been adopted by organisations throughout the world. According to Porter, very few industries remain in which competition has not intruded on stability and market dominance. "No company, and no country, can afford to ignore the need to compete... must try to understand and master competition." According to Miller, "The pace of technological development and the growth of global trade mean that today's business environment changes more quickly than ever before. Executives can no longer afford to rely on instinct or intuition when making strategic business decisions. In many industries, the consequence of making one wrong decision may be to see the company go out of business."  

According to Kahaner, what makes competitive intelligence even more critical in the new, post-industrial era is the growth of high-tech industries such as telecommunications, biotechnology, fibre optics, pharmaceuticals, and computers. These cutting-edge industries require large research and development expenditures, have razor-thin margins, fast development cycles, and are global.

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in scope. Their cornerstone is knowledge and that turning information into useable intelligence is what will ultimately separate successful companies from those that fall by the wayside.

SCIP's website has a 'Frequently Asked Questions' component regarding CI that documents CI's impact on businesses. In October 2002, the FAQ section included several comments pertinent to the current research project. For example, research showed that companies with well-established CI programmes enjoy greater earnings per share than companies in the same industry without CI programmes. Business Week magazine (November 26, 2001) was quoted as reporting "In a recession, competitive intelligence can pay off big." Texas Instruments was cited as an example whereby their CI team uncovered the need to pursue an acquisition before a rival could do so "and safeguard what is now a USD100 million business with enormous growth potential at a time when bright spots on the tech horizon are few." PricewaterhouseCoopers' March 2002 Trendsetter Barometer showed that fast-growth CEOs who rated competitor information as being either "very" or "critically" important grew revenues by 14.2 per cent, versus 11.8 per cent for all others - a 20 per cent faster rate. Significantly, those placing a premium on competitor information are outperforming their peers on sustained revenue growth, gross margins, and a number of other key performance measures. Merck's CI group was responsible for developing a counterstrategy that, over a period of 30 months has enabled Merck to "anticipate and outmanoeuvre the competition." This resulted in "saving approximately USD200 million to the bottom line -- so far". Robert Flynn, the former CEO and chairman of NutraSweet, said in a keynote address to the SCIP’s ninth annual conference that CI was worth up to USD50 million each year to his company.

While there is no definitive market data available, there is a burgeoning market for CI consulting, software, and service solutions. Fleisher and Blenkhorn estimated that the market bracket was

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42 Ibid.
43 Ibid.
44 Ibid.
45 Ibid.
46 Ibid.
47 Ibid.
between USD100 million and USD1 billion. In a 2002 intelligence market report, Frost and Sullivan reported that the intelligence systems market represented 6.4 per cent of the overall U.S. Command, Control, Communications, Computers, Surveillance, and Reconnaissance (C4SR) market with revenues of USD805.0 million in government fiscal year (GFY) 2000 (October 1, 1999 – September 30, 2000). According to Kroll Inc. (as reported by Reuters on Sept. 2, 2001), the market for business intelligence is worth about USD2 billion a year worldwide, including services ranging from detailed investigations to clipping news articles. In a survey of nearly 2000 SCIP members, over 25 per cent said their company's total CI spending in 2000 topped USD100,000. Almost 14 per cent said their company spent over USD500,000. The demand for CI professionals and services has as a result, increased exponentially.

Fleisher contends that more articles and books were published about CI during the 1990's than the sum total of those previously published. He also mentions that in support of the increased numbers of professionals and people interested in CI as an occupation or business activity, academes around the world have increased the number of courses and degree and post graduate programmes devoted to CI.

However, management today is faced with more information than it knows what to do with, or can assimilate. As the importance of 'intelligence' grows, so too does the complexity, breadth and depth of its tools. According to Kelley, as far back as 1964, Richard F. Casey, then senior vice-president of Benton & Bowles, was quoted as saying that, "With mountains of facts readily available, we must turn ourselves to a more pressing problem – the management of information for decision purposes". The fine-tuning role of such an activity has evolved into components of Competitive Intelligence whereby the increased prevalence of global competitiveness and other factors has developed a more ever changing plethora of influences to the mere survival of a business entity. As global competition intensifies rather than abates, firms must develop skills in

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scanning and monitoring other firms' competencies and assess their future focus and paths relative to their own. Decision-makers entrusted with designing strategy for their enterprises must be more cognisant and vigilant than ever before in recognising and understanding changing industry contexts, dynamics, and structures.

So, while market intelligence is important to the survival of a business or industry, the assimilation and generation of useable information is the more essential undertaking that can add timely value to the decision-making process. CI gives value-added quality to information gathering by introducing a system not only to gather information, but also to perform analysis and disseminate findings tailored to the needs of decision makers. According to Wang, as the competitive environment intensifies, firms need to develop skills for monitoring the strategic moves of competitors (visible and hidden) and potential collaborators, and for evaluating their potential impacts. The knowledge gained in analysing and anticipating the actions of rival firms can be used by decision makers to formulate strategy to outmanoeuvre them. He contends that the premise of Peteraf (1993) is that “a resource- or competence-based view of inter-firm rivalry may be an appropriate perspective to understand a firm’s source of competitiveness and, that from it, one may infer how and when that firm may compete in the future.” Hence, CI is becoming an integral component to operations of many organisations. A system that acts both as tactical intelligence and strategic intelligence, with sources and resources pulled from a diversity of primary, secondary and even tertiary influences, that is able to generate both qualitative and quantitative analysis. This in turn is able to assist and better inform decision makers on the subsequent planning, position and business development of the business entity and is a better solution to the pressing concerns of today’s business. Such a system is better known as Competitive Intelligence.

2.3 Definition of Competitive Intelligence

According to West, competitive intelligence is very different from the traditional concept of competition\(^{57}\). Companies compete across the full spectrum of their activities and whilst the marketplace is extremely important, it is by no means the only competitive arena.\(^{58}\) West also lists that there are several key areas in which competitive action can have a profound effect on a company's performance. They are:

- Strategic – competition for acquisitions
- Technology – competition for patentable products and process or licenses
- People – competition for the best staff
- Finance – competition for investors and funds
- Locations – competition for manufacturing, warehousing and office sites
- Suppliers – competition for raw materials or components
- Distribution – competition for shelf space
- Markets – competition for customers\(^{59}\)

Kelley, in his historical book published in 1968, first mentioned and defined the term competitive intelligence as a marketing intelligence system that prevents major problems from arising, rather than diagnosing a problem after it has reared its head.\(^{60}\) However, competitive intelligence as it has evolved and is practised today is not synonymous with marketing intelligence. An article from *Management Services* written by James Gulliford cites two possible definitions for competitive intelligence: “Information and knowledge to be obtained and used to formulate strategies for effectively dealing with competitors, customers and regulators” or “any information obtained from sources external to the firm can help improve the firm's performance”\(^{61}\). Underwood defines CI as “The identification of strategically important corporate intelligence (knowledge) needs and the process of resolving those needs through ethical information-gathering, analysis, and the presentation of such analysis to clients (internal or external)” He inferred that intelligence is the foundation of knowledge, which ultimately is the source of profit as it is a way of staying ahead of the competition\(^{62}\). Fleisher defines CI as generally “a process by


\(^{58}\) Ibid

\(^{59}\) Ibid


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which organisations gather actionable information about competitors and the competitive environment and, ideally, apply it to their decision-making and planning process in order to improve their performance.\textsuperscript{63} In 2002, Bensoussan and Fleisher further defined competitive intelligence as "a systematic process for gathering and analysing information to derive insights about the competitive environment and business trends in order to further the organisation's business goals". CI provides valuable input for such strategic decisions as which products, markets and business lines to invest in and develop, which to exit, divest, acquire or to develop joint ventures around.\textsuperscript{64}

Kahaner has a similar definition for CI: "Competitive intelligence is a systematic programme for gathering and analysing information about your competitors' activities and general business trends to further your own company's goals."\textsuperscript{65} Kahaner explained that CI is not just about collecting information - it is about analysing this information, filtering it, learning what's useful and what's not - and then using it to our benefit.\textsuperscript{66} West's definition of CI is "the process by which companies inform themselves about every aspect of their rivals' activities and performance."\textsuperscript{67} According to Porter, knowledge of the company's capabilities and of the causes of the competitive forces will highlight the areas where the company should confront competition and where to avoid it.\textsuperscript{68} Kahaner further points out that competitive intelligence is not a function, but a process that should appear in all aspects of a business as one seamless, continuous activity and not relegated to one area, division or unit.\textsuperscript{69} Fuld narrows CI as "highly specific and timely information about a corporation."\textsuperscript{70}

Related terms include business monitoring, business intelligence, or competitor intelligence, but the term competitive intelligence clearly predominates. These terms often seem to be used with


\textsuperscript{66} Ibid. p. 29.


\textsuperscript{70} Fuld, L.M. Competitor Intelligence. New York: John Wiley & Sons, 1985, pg. 9.
very similar meanings. Jerry Miller, however, attempted to differentiate between three concepts. According to the author, business intelligence monitored a wide range of activities across the external environment of an organisation. Competitive intelligence focused on the strengths, weaknesses, and activities of the organisations with similar products or services within a single industry, while competitor intelligence emphasised the acquisition of detailed and current information regarding a specific organisation\(^7\). This level of differentiation seems excessive; it is difficult to imagine busy professionals, who frequently refer to their activities by the acronym CI, would have the time to apply such categories in practice. Perhaps the best definition comes from Gordon's pioneering book on the subject, published in 1989. He firmly rejected the term competitor intelligence in favour of competitive intelligence, which he defined as, "the process of obtaining and analysing publicly available data to develop the information necessary to serve as input to competitive strategy development"\(^7\)

Generally, modern CI practitioners obtain crucial information for decision-making by using unique set of skills, knowledge, and abilities to uncover relationships that may enable their organisations to compete more effectively in the product or service marketplace. It is important to note that while previous and available definitions of CI point to the scope and context in which the nature of CI is derived, some proponents argue in the way of ethics and the source of information. Other definitions of competitive intelligence are careful to emphasise the public nature of the information being sought; "the use of public sources to develop information about the competition, competitors and market environment\(^7\); and as the "...gathering of information, the majority of which is readily available"\(^7\)

Dutler et al. defined CI as a disciplined system of primary and secondary research, analysis and dissemination of findings tailored to serve executives who need to make informed decisions to keep their company responsive, well-positioned, and profitable\(^7\). Miller gave a more specific definition that is the legal collection and analysis of information regarding the capabilities,

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vulnerabilities, and intentions of business competitors, conducted by using information databases and other "open sources" and through ethical inquiry providing management with early warning of changes in the competitive landscape. For the objectives of this research, the definition of CI was adapted from the SCIP definition Competitive Intelligence: A systematic and ethical programme for gathering, analysing, and managing external information that can affect a company's plans, decisions, and operations.

2.4 Origins and Evolution of Competitive Intelligence

The employment of competitive intelligence as a concept can be correlated and derived from an inexhaustive list of sources, hence, its employment may be traced to a long and winding history. Techniques that have been used by intelligence agents in the past and ancient military strategists in serving past governments and economies, ancient kingdoms and empires, are valuable references in providing a more comprehensive outlook for CI as a discipline. As it is for many schools of thought, the foundation or basis for most disciplines is usually found in its history. Hence, this section presents an overview of incidences in history, guided by a timeline of global incidences from circa 1000 B.C. to the 2000s. It acts as the beginning of a study to trace the origins and evolution of CI with a purpose to expand CI as a discipline, just as other disciplines have justified their existence from the greater past.

2.4.1 Competitive Intelligence: Revolution or Evolution?

Prescott and Gibbons wrote one of the first articles on the evolution of CI. They identified three stages of CI development and contended that stage one occurred during the 1960s and 1970s. They defined CI activities at this time as being mostly associated with data-gathering, and that they were informal and tactical. They explained that CI was poorly linked to decision-making and involved little analysis. Prescott and Gibbon's second stage of CI Development was defined as CI activities in the 1980s when competitor and industry analysis became popular. According to them, competitive intelligence personnel switched from library functions to marketing and planning functions. They explained that competitive intelligence activities remained tactically oriented. The third stage of Prescott and Gibbon's CI Development that began in the 1990s,

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showed CI contributing to strategic decision-making that were built into dedicated formal units, either on their own or within marketing or planning. Since then, competitive intelligence activities have become oriented to both tactical and strategic decision-making and include qualitative and quantitative analysis. Competitive intelligence receives moderate attention from top management and often makes a valuable contribution to strategic decision-making.

Historical records reveal the important role that intelligence has played in the history of countries. Accordingly, CI evolved from developments in economics, marketing, military theory, information science, and strategic management. The interrelation and cross dependency of those developments have shaped the way CI has been adapted and customised. In addition, some argue that CI had its genesis in religious texts. Some say that it was derived from warfare. As such, CI has been and can be approached from many angles; an information theory angle; a military analogy viewpoint, an experimental approach; as a problem in organisational theory and decision-making; or from a down-to-earth procedural point of view.

It is now obvious that the concept of CI did not suddenly come into being as an effective modern tool in strategising the modus operandi of organisations. The very idea of CI and its terminology, has been around far longer than when the term was first considered an essential practice by American organisations wishing to succeed in their chosen commercial arena.

Primarily, the technology explosion of the 1990s probably stimulated the notion of CI being something entirely new or even revolutionary. The emergence of the Internet and online databases offered an almost inexhaustible supply of information. The technology explosion was credited to mechanisms in North America that catalysed the new economy of information and

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intelligence. Naturally, the genesis of this sudden accessibility to and availability of a lot of information then required special methods for filtering, organising and analysing. Systems and software for managing information had to be conceptualised and developed. Eventually, for more efficient management of information storage, as well as retrieval and analysis, information was customised to fit the requirements of a profile. In some cases, the profile monitored sets of information that would ensure some sort of competitive sustainability. According to Kathryn Harrigan, Professor of Business Leadership at Columbia University, "Information and communication technology, globalisation, and rising worldwide consumerism have unleashed a variety of dissimilar competitors that bring their own diverse rules to competition and upset the game’s profitability. Familiarity with the art of the moving target – outmanoeuvring via a sequence of temporary advantages – is required knowledge in the new game that many firms are now forced to play."\(^88\)[1]

This brought about the U.S. ‘birth’ or rebirth of the term “Competitive Intelligence” and its corresponding techniques, processes and importance to the continued general well-being or expansion of an organisation. By this time, both the conceptual nature and practice of CI techniques were mostly inspired by methods practiced in military intelligence\(^89\), which were adapted into a more commercial environment. Additionally, not only did competitive intelligence practitioners have to develop a system to act as an information moderator, they were also responsible for protecting said information. This created both offensive and defensive aspects of the field, further linking it to the military metaphor\(^90\). CI then became a term that encapsulated all activities, which involved monitoring and acting upon information in order to achieve competitive sustainability.

The military has long recognised the great importance of intelligence\(^91\) and has thus achieved an advanced stage of expertise therein. According to William T. Kelley, military intelligence is a rich source of proven principles from which the science of business administration can profitably borrow\(^92\).

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92 Ibid.
While intelligence and competition have had a long association with successful campaigns, it is not recently as commonly believed that this relationship is replicated into a more profitable correlation in business. The application of intelligence to marketplace competition has existed commercially since the first salesperson got wind of a competitor’s price reduction and decided to communicate this intelligence to his/her superior. Historical records indicate that the Byzantine emperor Justinian I deployed monks to steal silk worms from the Chinese in an attempt to understand how to make silk. While no formal system was established, CI was practiced but the recognition of the need for arranging for systematic (and legal) intelligence came slowly in business. As such, CI has been variously “parked” under the aegis of marketing, business strategy, advertising, market monitoring and the like until it has been formalised and evolved into either a unit or department within an organisation or a pervasive modus operandi throughout an organisation.

2.4.2 Historical Incidences Towards CI

While CI has been touted as an American-born concept and practice, incidences in history and in other countries prove otherwise. CI as an intelligence activity, especially derived from either military, economic, commercial and or political intelligence influences, has existed for over 5,000 years of China’s history. In Competitive Intelligence, Jim Underwood undertook to illustrate a representation of the diversity of intelligence and its uses as it has been recorded over the last 3000 years. His timeline suggests that the use of intelligence has been in practice as far back as c. 1000 B.C. as evidenced by some early written records. He continues with the use of intelligence and spies for military purposes from c. 1000 A.D. His findings reveal that in the 1960s research and business-related intelligence came into use. The 1980s saw the introduction of formal business intelligence-gathering functions. The 1990s saw the introduction of technology, more specifically the Internet, as a means to increase the depth and breadth of Competitive Intelligence.

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It is the current decade in which CI has become the dynamic and complex entity that it is today. Inspired by Jim Underwood’s brief timeline, a more detailed and comprehensive pictorial depiction of CI incidences around the world and the subsequent CI evolution was developed and is portrayed below (Table 2.1):

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<th>c. 220’s BC</th>
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2.5 The Competitive Intelligence Process

Kahaner believes that companies need a formal system for moving competitive information and intelligence around their firms. Managers must view intelligence as a process that moves throughout their organisation, touching every facet of everything their company does. A CI system encompasses the potential effects created by all external and internal elements of the business environment that impact on the current competitiveness and future competitive ability of an organisation. A CI system allows the organisation to face the challenges of its environment. Ideally, competitive intelligence is best thought of as a process that is used to make decisions from the largest strategic decision to the smallest tactical move. It is a process that permeates the entire company.

According to Prescott and Gibbons, an effective competitive intelligence programme (CIP) is the foundation in which strategies and tactics are built, assessed and modified. They defined a CIP as a formalised, yet continuously evolving process by which a management team assesses the

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99 Ibid, p. 35.
evolution of its industry and the capabilities and behaviour of its current and potential competitors to assist in maintaining or developing a competitive advantage. They further wrote that CIPs have four commonalities:

1. CIPs focus on industries and competitors,
2. CIPs are concerned with the means and management of transforming information into relevant intelligence,
3. CIPs are concerned with the management, incidences and roles of formal and informal intelligence antennas, and,
4. CIPs evolve over time to respond to the ever-changing critical issues and to facilitate organisational renewal.102

The CI process is, essentially, a systematic process for collecting and analysing information about competitors’ activities, one’s business environment, and business trends to further one’s own organisational goals103. According to Walle, a key component of that methodology (CI) involves combining scraps of seemingly unrelated data into a seamless interpretation capable of demonstrating the goals, strengths, and weakness of the group being investigated104. Competitive Intelligence links apparently unrelated signals, events, perceptions, and data into patterns and trends concerning the business environment105. The compilation of raw information from internal and external sources is then refined into intelligence whose format is readily accessible and useful to a decision-maker’s unique or critical intelligence needs (CINs). Fuld’s guidelines on CIP activities, simply list the process as involving the collection of data (scattered bits and pieces of knowledge), pooling the information and bits of knowledge, analysing and distilling the information and then turning that information into intelligence (the implication that will allow one to make a decision)106. The intelligence should also be disseminated to its target in order to assist in decision-making. However, it is important to note that, in gathering intelligence, Kelley argues for the employment of carefully controlled observation and the utilisation of the basic methodology of science to assure maximum accuracy of observation and inference from

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106 www.fuld.com
observation. SCIP also calls for the ethical means of procuring sources of information. The CI process' guideline should be the legal collection and analysis of information regarding the capabilities, vulnerabilities, and intentions of business competitors as well as the company's own internal forces. Personnel must also have the ability to properly gauge the competitive scenario and have the ability to correctly categorise, collate and streamline such data into a comprehensive, timely and actionable intelligence. This would form a series of tasks that would require personnel to be highly multi-skilled and well informed about their corporation and the industry. All this would be refined and translated into meaningful intelligence for the use of decision makers as a tool to respond to changes in the competitive landscape.

2.5.1 The Intelligence Cycle

The basic unit of a CI system is the intelligence cycle. Kahaner claims that the process that is used by companies is similar to that employed by the CIA and others in the intelligence community worldwide. This CI sequence has evolved into four consecutive steps:

1. **Planning**: the first step encompasses three critical aspects of planning for CI: gaining a clear understanding of the user's needs, including their resource constraints, such as budgets, human, and time; a data collection and analysis plan; and an effort to keep the user informed.

2. **Collection activities**: refers to the gathering of data legally and ethically from and about the sources or targets.

3. **Analysis**: this step allows data collected to be reviewed, tested, and subject to challenge. The analysis process reduces the data into a usable form for decision making.

4. **Dissemination**: the final step in the cycle refers to the actions taken to disseminate or communicate the findings to users and decision makers, and to gain feedback for future CI planning or strategic reassessment.

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110 *Ibid*, p. 44.
Disseminating
Summarised results of activities and intelligence are presented and disseminated in an appropriate format to recommend follow-up action and implementation.

Planning
Statement of problems in understanding user's needs/constraints, collection methods of definition of required analysis

Data Collecting
Gathering and design of the study or survey from primary and/or secondary sources that make up the internal and external intelligence components

Analysing
Interpretation of data formulates hypothesis and derivation of conclusions. Making sense of data by refining essential information into usable intelligence for decision-making.

The Intelligence Cycle

Figure 2.1: The Intelligence Cycle. Summarised from source: Kahaner, L. Competitive Intelligence: From Black Ops to Boardrooms – How Businesses Gather, Analyse, and Use Information to Succeed in the Global Marketplace. New York: Simon & Schuster, 1996, p. 44.

Additionally, the diagram above summarises the components of the Intelligence Cycle. However, some authors may divide the process into three phases, six or seven, but all cover essentially the same elements with more or less detail in the descriptions of the basic components.

For example, one is by Wilson of Nexstep and Powell of Infostrat, who developed a 7-step cycle that illustrates the changes in the forms of the gathered information as it goes through the execution of each step to become actionable intelligence. The model adapted from Wilson and Powell is shown in Figure 2.2 below:

Figure 2.2: The Intelligence Cycle II. Source: Society of Competitive Intelligence Professionals, “CI Today,” SCIP presentation slides, 1999, retrieved November 2002, from the World Wide Web: http://www.scip.org/


The above diagram Figure 2.3 illustrates Bouthillier and Shearer’s 6-step version of the Intelligence Cycle, aptly called the Information-processing model of Competitive Intelligence Cycle, based on a similar six-step information-processing model developed by Choo shown in Figure 2.4 below. Like Choo’s model, each step in Bouthillier and Shearer’s cycle represents an information related process.


Although there have been several versions of Intelligence Cycle models, it has been argued that few have studied the measurement methods and output value, as well as its effectiveness within the CI practicing community.116 So far, the phases of the Intelligence Cycle are mere propositions of what authors believe might work in the business environment, mainly because it was based on an intelligence process used by the CIA. According to Kahaner, since the time of its introduction by William Fair in 1966, this notion of its applicability has grown to become an emerging business construct.117 However, although the CIA model has been largely accepted by industry, Dishman and Calof stated that its actual structure being implemented (as well as its methods of measurement) is still largely unknown.118 This notion was observed by Wright and Calof who presented a more complex model, which implies that the CI process does not necessarily happen in a step-by-step process, as other authors have proposed; it is a continuous, yet systematic,

process, where the phases happen simultaneously, allowing process and structure and culture and awareness being the determinants that influence the process flow.

Nevertheless, although the sequence in the CI process and effectiveness had been questioned, the research assumed that it is largely agreed that CI is a sequential process. Therefore, although most versions of the Intelligence Cycle generally cover the same elements, this project chose a version proposed by Bouthillier and Mercier as a basis to study the value of each phase placed by IT-based SMEs in Malaysia, among other objectives of the research. The reason for this model being chosen for the research was because of the inclusion of a phase relating to software functionality (Organisation, Storage, and Retriaval), which was regarded as relevant to the research.

2.6 Key Intelligence Topics (KIT)

Key intelligence needs, play an important role in identifying the variations and similarities in terms of strategic targets, areas of development, and key competitors within SMEs. The Key Intelligence Topics process is mainly an interview process with key decision makers in the companies. This method was first developed by Jan Herring in the 1980s, which was adapted from his U.S. government experience with executive branch interviews as a principal input for
developing the national intelligence agenda\textsuperscript{119}. Herring first applied KIT interview methods in the private sector at Motorola in the mid-1980s. Later, he used the KIT interview process in a variety of consulting assignments for clients in other companies, principally as an assessment of intelligence needs.

According to Herring, KIT interviews at the beginning of a CI programme provide the focus and prioritisation needed to conduct effective intelligence operations and produce the appropriate intelligence. They also permit the programme’s designers and developers to determine the skills needed for CI and the level of resources needed to address the organisation’s actual intelligence needs\textsuperscript{120}. In effect, the analytical understanding of management’s initial KIT (specifically, the nature and scope of the organisation’s intelligence needs) permits the programme resources to be optimally matched to the expected demand\textsuperscript{121}. This part of the literature discusses in more detail the categorisations of the Key Intelligence Topics taken from Herring’s article published in SCIP’s Competitive Intelligence Review\textsuperscript{122}, the outcome of which is to complement the structural and contextual characteristics in understanding the relationship of CI and SMEs, and to propose proper methods and tools for producing intelligence later in the research.

Relevant to intelligence needs, a survey study of 70 SME managers had been conducted to gather information needs of SMEs to conduct CI. One of the conclusions stated that managers expressed needs according to the decision-making process stages\textsuperscript{123}. This conclusion can be said to agree with Herring’s theory, where a company’s intelligence needs can generally be assigned to one of three functional categories:

- \textit{Strategic Decisions and Actions}, which includes the development of strategic plans and strategies.
- \textit{Early-Warning Topics}, which includes competitor initiatives, technological surprise, and governmental actions.
- \textit{Descriptions of the Key Players} in the specific marketplace, which includes competitors, customers, suppliers, regulators, and potential partners.

\textsuperscript{120} Herring, J.P. Key Intelligence Topics: A Process to Identify and Define Key Intelligence Needs. \textit{Competitive Intelligence Review}, 10(2), 1999, pp. 4-14.
\textsuperscript{121} Ibid.
\textsuperscript{122} Ibid.
\textsuperscript{123} Salles, M. Decision making in SMEs and information requirements for competitive intelligence. \textit{Production Planning & Control}, 17(3), April 2006, pp. 229-237.
This categorisation helps identify different types of KITs that require different types of intelligence approaches or operations. For example, intelligence to support decision making usually requires both business and intelligence analysis, supported by thorough secondary-source research with current human-source collection inputs. Early-warning intelligence is critically dependent on monitoring, with analysis serving the detection mechanism that "signals" possible future developments that a company should be prepared to act on. Player-oriented intelligence usually takes the form of analytical profiles, sometimes tailored to specific user questions or planned actions. Identifying work processes, work flow and the distribution of resources can then be more logical, analytical, meaningful and manageable. The following will discuss each KIT category in more detail.

2.6.1 Strategic Decisions and Issues KITs

According to Herring, in most respects, this set is the most important for a successful CI programme. Identifying and meeting the specific needs of management for planned decisions or pending actions provide the most visible and tangible measures of intelligence value. Producing useful and actionable intelligence in response to important business decisions and actions is the main purpose of any CI programme.

The intelligence topics in this category will vary in form from specific questions and/or decision statements to the more typical "topic" subject, which must be better defined later through interactive dialogue with the user. Both forms are quite acceptable, particularly at the time they are identified, because both will eventually have to be refined when the KIT is turned into an intelligence action plan for management review and approval.

Decisions/Issue KITs run the gamut from strategic investments decisions, to action plans for new product rollouts, to requests for intelligence inputs for the formulation of strategic plans and new competitor strategies. As long as management's stated need for intelligence involves business decisions or pending business actions, such requests are probably legitimate KITs. The examples shown below (Table 2.2), taken from actual KIT interviews conducted by the author, demonstrate the breadth and variety of management intelligence needs as well as the different forms they might take:

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Table 2.2: Examples of Topics on Strategic Decisions & Issues

1. Provide intelligence inputs for the company’s strategic plan to create “our” future competitive environment.

2. Formulating “our” global competitive strategy: Assess the role of competitors in achieving our business objective(s).

3. Globalisation of (Our) Industry: How/ with whom should we proceed? What are out competitors doing? With whom?

4. Asian/South American/etc. market development: Assess current competitive situation; describe the most likely future situations.

5. Strategic investment decisions: Identify and assess changes in the competitive environment, including:
   - Key/ critical industry investments by others
   - Cash requirements of other industry companies
   - Involvement/ role of investment community
   - Possible alternative sources for future investments, including alliances, acquisitions, etc.

6. Should we expand our present production capacity or build a new plant with a more cost-effective manufacturing process?

7. What plans and actions must we take to maintain (our) technological competitiveness vis-à-vis key competitors?

8. “Product” development programme: Identify and assess the programmes of our leading competitors and assess the status of other competing technologies.

9. New product development and roll-out: How and when will the competitors respond? How will they affect our plan?

10. How will our new distribution/sales/marketing strategy be viewed by the industry? Our competitors? Our distributors?

11. Protection of “our” proprietary information/technology
   - Competitors efforts to acquire it?
   - Others interested in it?

12. Human resource issues: Hiring and retaining key employees.

Source: Herring, J. “Key Intelligence Topics: A Process to Identify and Define Key Intelligence Needs.” Competitive Intelligence Review, 10(2), 1999, pp. 4-14.

2.6.2 Early-Warning KITs

Early-warning topics typically stress activities and subjects which management does not want to be surprised by. They are usually heavily weighted toward threats, though they need not be because good intelligence operations are also quite capable of searching for possible business opportunities. Again, topic subjects run the gamut, often reflecting the range and variety of the Strategic Decision KITs. The table below shows a typical set of Early-Warning KITs (specific examples about competitors have been left out for brevity).
Table 2.3: Examples of Early-Warning Topics

1. Areas of possible technological “breakthrough” that could dramatically affect our current and future competitiveness.

2. Technological developments, affecting either production capabilities or product development and their uses by competitors and others.

   - Their financial “health”
   - Cost & quality problems
   - Possible acquisition and/or alliances.

4. Possible disruptions in supplies of crude-oil/components/etc.

5. Change in (our) industry procurement policies and processes.

6. Change in customers/competitors perceptions of us/our services.

7. Companies and/or combinations of companies, considering possible entry into our business or markets.

8. Changes in international political, social, economic or regulatory situations that could effect our competitiveness.

9. Regulatory Issues: Near-term changes; deviations in long-term trends; other governmental changes that could impact current regulatory regimes, e.g. people, policy, etc.

10. Intelligence and Alliances, Acquisitions, and Divestitures among our competitors, customers, and suppliers:
    - Reasons and forces causing them
    - Objectives and purposes of completed deals

11. Financial Initiatives by major competitors:
    - Changes in current financial strategy(s)
    - Alliances, acquisitions, divestitures, etc.

12. Interests and efforts by others to acquire our company.

Source: Herring, J. Key Intelligence Topics: A Process to Identify and Define Key Intelligence Needs. *Competitive Intelligence Review*, 10(2), 1999, pp. 4-14.

These KITs are often more cryptic than Decision and Player KITs, mainly because managers often are expressing hunches or “fears.” However, they are equally important, and the turning of such KITs into intelligence monitoring activities would potentially translate unanalysed concerns into potential business actions — even to the extent of contingency plans that can be initiated should intelligence discover early-warning signs of the realisation of these fears and/or concerns.
2.6.3 Key Player KITs

Among the three KIT categories, Key Player KITs are the least actionable. Below are some examples:

Table 2.4: Examples of Topics on Key Players in the Marketplace

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<td>1.</td>
<td>Provide profiles of our major competitors, including their strategic plans, competitive strategies, financial &amp; market performance, organisation &amp; key personnel, R &amp; D, operations, sales &amp; marketing, etc.</td>
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<td>2.</td>
<td>Provide in-depth assessments of Key Competitors, including:</td>
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<td>Their competitive intent vis-à-vis us and our major customers</td>
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<td>Strategic plans and goals, including international objectives</td>
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<td>Key strategic: Financial, technological, manufacturing, business development, distribution, and sales and marketing</td>
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<td>Current operational and competitive capabilities</td>
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<td>3.</td>
<td>Identify new and emerging competitors, particularly those coming from entirely different industries.</td>
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<td>4.</td>
<td>Describe and assess our current and future competitive environment, including: customers and competitors and competitors; markets and suppliers; production and product technologies; political and environmental; and the industry's structure, including changes and trends.</td>
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<td>5.</td>
<td>New customers, their needs and future interests: What are they and how are our competitors trying to satisfy them?</td>
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<td>6.</td>
<td>Industry and customer news, attitudes and perceptions regarding &quot;worth&quot; or our branded products, services, etc.</td>
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<td>7.</td>
<td>Identify and assess new industry/market player, including: Suppliers, major distributors, customers and/or competitors that are considering entry into our business.</td>
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<td>8.</td>
<td>New technology/product developers: What are their plans and strategies for competing in our industry?</td>
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<td>9.</td>
<td>Need significant improvement in market share and growth data, including that of our competitors.</td>
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<td>10.</td>
<td>Management and operations need better intelligence concerning regulatory and environmental activities for planning and decision making.</td>
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<td>11.</td>
<td>The investment/financial community: What are their views and perceptions of our business and industry?</td>
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<tr>
<td>12.</td>
<td>What are the interest and purpose of various suppliers and industry observers in gathering information about our company?</td>
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Source: Herring, J. Key Intelligence Topics: A Process to Identify and Define Key Intelligence Needs. *Competitive Intelligence Review*, 10(2), 1999, pp. 4-14.

The Key Player KITs usually reflect a manager or management team's need to better understand the "player". Typically, managers each have a different mental model of the player and therefore they tend to think and act differently concerning that player. Usually, a profile or assessment is developed at the beginning of an action or related decision-making process, which allows all managers to at least have a common understanding of the player.
Player KITs can vary considerably depending on the management team's need and sophistication. The most important aspects of such KITs are the specific user questions regarding the players. The topics posed by management about a common competitor, for example, are to be used to both define the competitor profile and to frame the answers to their separate intelligence need analytically. Then, by analytically combining both, the competitor report would provide the basis for developing a unified and coordinated response to this common "threat". Overall, addressing the user's questions along with the requests for a competitor profile leads to competitive action.

2.7 CI Typologies and Taxonomies

Similar to the taxonomy produced during this research, there have been other published materials that reported empirical studies on CI-related taxonomy and typology, which purposes relate to breaking down and classifying the CI practice and processes by way of value-added, approaches, and attitudes. In other words, these typologies and taxonomies represent CI practices taken from different angles and perspectives. Wright and Calof executed a pilot-study, based on four attributes: attitude, gathering, use and location, to better understand how UK companies conduct CI.124 From the results of the pilot, the authors developed and enhanced a typology that illustrates a continuum of behaviour on four strands of investigation. Wright et al., concluded that the best CI practice was a combination the strategic attitude, hunter gathering, strategic user, and designated location, shown below in Figure 2.6.

![Figure 2.6: CI Practice (Source: Wright, S, Pickton, D., and Callow, J. Competitive Intelligence in UK Firms: a typology. Marketing Intelligence and Planning, 20 (6) 2002, pp. 349-360.](image)

Liu and Wang125 integrated Wright and Calof's126 dimensions in a recent study to develop a CI taxonomy for the service industry. This taxonomy was developed using a mathematical process constituted by an approach using service modules and weights. The model was reported to not

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only forecast a competitor’s service business strategy, but it can also help develop the firm’s own new service strategy. The resources of the firm can then be realigned to counteract the competitor’s strategy. The combinational sequence of service modules is shown below in Figure 2.7:

![Figure 2.7: Combinational sequence of service modules (Source: Liu, C.H. and Wang, C.C. Forecast competitor service strategy with service taxonomy and CI data. European Journal of Marketing, 42 (7/8), 2008, pp. 746-765)](image)

Another typological CI study on attitude by Rouach and Santi reported that there are five types of CI attitudes: Warrior, Assault, Active, Reactive, and Sleepers\(^{127}\). The table below (Table 2.5) summarises the elements in the typology:

<table>
<thead>
<tr>
<th>Analyst type</th>
<th>State of Mind</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warrior</td>
<td>War Mentality</td>
<td>Sophisticated tools (war room in certain cases)</td>
</tr>
<tr>
<td></td>
<td>Ruthless fight against disinformation</td>
<td>Variable methods (code of ethics)</td>
</tr>
<tr>
<td></td>
<td>Patent and counterfeit war</td>
<td>Unlimited or significant resources</td>
</tr>
<tr>
<td></td>
<td>Offensive position</td>
<td>Team leaders</td>
</tr>
<tr>
<td>Assault</td>
<td>Former Secret Service agents</td>
<td>Significant resources</td>
</tr>
<tr>
<td></td>
<td>Sharp processing of data</td>
<td>Professionalism and ethics</td>
</tr>
<tr>
<td></td>
<td>Hunt for strategic information</td>
<td>A lead lookout</td>
</tr>
<tr>
<td></td>
<td>Observatory of competition</td>
<td>Value put on human intelligence</td>
</tr>
<tr>
<td>Active</td>
<td></td>
<td>Limited resources</td>
</tr>
<tr>
<td></td>
<td>Beginning of operational CTI network</td>
<td></td>
</tr>
<tr>
<td>Reactive</td>
<td>Opportunists</td>
<td>Reacts to attack</td>
</tr>
<tr>
<td></td>
<td>Very limited budget</td>
<td></td>
</tr>
<tr>
<td>Sleepers</td>
<td>No particular action</td>
<td>Blind, passive</td>
</tr>
<tr>
<td></td>
<td>NIH syndrome</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.5: Five Types of Intelligence Attitudes (Source: Rouach, D. and Santi, P. Competitive Intelligence Adds Value: Five Intelligence Attitudes. European Management Journal, 19(5), 2001, pp. 552-559)

---

From a strategy perspective, according to Courtney et al. at the heart of the traditional approach to strategy lie the assumptions that executives, by applying a set of analytical tools, can predict the future of any business accurately enough to choose a clear strategic direction for it. That traditional approach often involves underestimating uncertainty in order to lay out a vision of future events sufficiently precise to be captured in a discounted-cash-flow (DCF) analysis. However, when the future is truly uncertain, this approach is at best marginally helpful and at worst downright dangerous; underestimating uncertainty can lead to strategies that neither defend a company against threats nor take advantage of the opportunities that higher levels of uncertainty provide. In another extreme, if managers cannot find a strategy that works under traditional analysis, they may abandon the analytical rigour of their planning process altogether and base their decisions on gut instinct alone. Making systematically sound strategic decisions under uncertainty requires an approach that avoids this dangerous binary view. The competitive intelligence process (or systems) and CI practitioners seek to control such uncertainties by obtaining and analysing bits and pieces of data and information into useable and relevant timely intelligence for use in decision-making and the development of a responsive strategy. In light of the very real need for quantifiable, identified and reliable intelligence little wonder that the competitive intelligence industry has spawned a host of players.

The CI practice is made up of a set of individuals, groups or organisations, whether formalised or not formalised, who seek to undertake a part or the whole process of a competitive intelligence system. A competitive intelligence system is the gamut of effort in collecting information, analysing and filtering the information and transforming it into useable and relevant intelligence. All this is presented to decision makers in a way that would allow them to make better informed decisions and formulate strategies to either overcome identified threats or to capitalise on identified opportunities.

According to Prescott and Gibbons, and Rojo, the competitive intelligence industry for businesses has become a multibillion dollar fragmented industry. The diverse motivations,

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behaviours and products of these CI practitioners are defined in the following typology of CI Players, Table 2.6, below:

<table>
<thead>
<tr>
<th>Type of CI Practitioner</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence Traders</td>
<td>Intermediary between the intelligence market and the investment, commercial and technology markets. They serve as information collectors and advisors providing viable solutions. Most intelligence traders are consulting firms, advisory services and business promoters.</td>
</tr>
<tr>
<td>Information Industry Merchants</td>
<td>Amalgam of information content, information and communication technologies to tackle the integration process of information products and services. The products and services include databases, repackaged value-added data, assessment reports of firms, industries, and countries, electronic communication packages, executive information systems, hardware, software, artificial intelligence tools and management expertise for the design and organisation of information technologies.</td>
</tr>
<tr>
<td>Niche Intelligence Experts</td>
<td>Network of specialists who have a focused set of skills in a particular intelligence domain. Individuals or think-tanks that have expertise and intelligence related to specific countries, industries, firms, technologies, management processes and/or personnel. They have a reputation for trustworthy, timely, accurate, and relevant information that is developed into the required client-oriented intelligence.</td>
</tr>
<tr>
<td>In-House Competitive Intelligence Units</td>
<td>Formally established in-house units to address competitive intelligence needs of a company. Units vary in placement, focus, budgets, sophistication and interaction with decision-makers. Activities usually support company strategies, marketing and operations.</td>
</tr>
<tr>
<td>Cooperative Intelligence Partnerships</td>
<td>A partnership between companies to share the cost of a competitive intelligence programme, products and/or service. Activities allow for an intelligence collection point to better understand the culture, organisational systems and best practices of other firms.</td>
</tr>
<tr>
<td>R&amp;D-related Groups</td>
<td>Specialists or a group of people who are in a position to collate, analyse and disseminate scientific and technological knowledge about discoveries that may have an impact on the company’s product(s) and/or service(s).</td>
</tr>
<tr>
<td>Academics</td>
<td>Academicians who either specialise or are devoted to the conceptualisation, rationalisation and dissemination of knowledge and experiences on procedures and methodologies required to undertake intelligence activities. Their continuous study and networks and partnerships with organisations and governments allow access to the building blocks of the industry.</td>
</tr>
<tr>
<td>Governments</td>
<td>Government and their agencies that play varied and multi-faceted roles in shaping, structuring and utilising the intelligence market.</td>
</tr>
<tr>
<td>International Organisations</td>
<td>Organisations that traditionally seek to promote international cooperation, economic and cultural integration, multilateral conflict resolution, systematic analysis of worldwide and regional problems, etc., that are able to play a role in any CI activity.</td>
</tr>
<tr>
<td>Professional Associations</td>
<td>Trade groups, associations and organisations which have the capabilities to observe the activities of the industry and organise activities in support of maintaining or further developing the dynamics of the industry.</td>
</tr>
</tbody>
</table>


All of the activities undertaken by CI players are transformed into CI-related products that would in some way create a schematic of reliable and relevant intelligence for the use of decision makers to steer their companies into a competitive advantage. According to Porter, the essence of
strategy formulation is coping with competition\textsuperscript{131}. Whatever their collective strength, the corporate strategist’s goal is to find a position in the industry where his or her company can best defend itself against these forces (competition) or can influence them in its favour. The collective strength of these forces may be painfully apparent to all the antagonists; but to cope with them, the strategist must delve below the surface and analyse the sources of each\textsuperscript{132}.

Pepper believes that business intelligence must develop from collecting, analysing, and disseminating knowledge and information to the point of helping organisations acquire and use information and knowledge to create winning strategies\textsuperscript{133}. Porter further expounded that knowledge of these underlying sources of competitive pressure provides the groundwork for a strategic agenda of action. They highlight the critical strengths and weaknesses of the company, animate the positioning of the company in its industry, clarify the areas where the strategic changes may yield the greatest payoff, and highlight the places where industry trends promise to hold the greatest significance as either opportunities or threats. Understanding these sources also proves to be of help in considering areas of diversification\textsuperscript{134}.

According to Bergeron and Hiller, there are three groups of key actors: the CI specialists whose main mandate is to manage the formal CI process, the decision makers who use actionable intelligence produced by CI activities, and all members of an organisation who, together, form the human intelligence network that contributes to a fully fledged, organisationally integrated activity, blending CI and knowledge management (KM) in their information strategies\textsuperscript{135}. This means that, in a CI division of an organisation, the information specialist, managers, and analysts each may have their own areas of expertise and it may be rationalised that the combination of their skills sets will be able produce efficient CI; however, it is important to realise that their roles may overlap throughout the CI processes, creating inconsistency in the practice.

Although the information specialist should be primarily responsible for the information management phase in CI\textsuperscript{136}, as often repeated in literature, he or she should increase its capacity to create and use primary data effectively in addition to tapping into secondary sources, and should also master the various technologies that not only support the information management aspects of CI, but also the planning, analysis and dissemination of information and intelligence.\textsuperscript{137} Further, as gatherers and holders of relevant competitive information within a company, it does not take much reasoning for the information specialist to be the one to be involved throughout the entire analytical process and to be able to achieve credible recommendations.\textsuperscript{138} It is also logical for business specialists and analysts who are known for their skills of synthesis, hypothesis creation and assumption building and testing, to participate in information activities in providing efficient CI\textsuperscript{139}.

As implied by Calof and Wright, there are no proper guidelines regarding the optimal mix of skill sets and/or assigned roles within CI, which situation is parallel to the lack of study in finding the value each phase plays in the CI process\textsuperscript{140}. In contradicting what has been written here so far, the need for a CI specialist within an organisation still depends on many elements, such as the organisation's culture, size, and span of operations\textsuperscript{141 142}. For example, most probably, the need for the presence of a CI specialist may be adopted by larger organisations, and small and medium-sized organisations will generally not have dedicated CI specialists; decision makers and other key employees in the company may take on the roles instead. This only proves that CI, as a discipline, is still in transition and in need of more in-depth research, as little is known about the appropriate mechanisms that need to be put in place to foster, maintain, and enhance its ongoing involvement.

2.8 Conclusion

The cumulative literature gathered to construct this chapter introduces the research to the environment surrounding the development and growth of Competitive Intelligence into what it is today. As it is for many developing concepts, the CI concept is not without ‘holes’ to be filled in by further research and philosophical insights. For example, although there exists an elaborate history of CI, the CI process used today and how it has been used in business during the last half of the century still lacks measurement and consistency in its value-addedness, which in turn, suggests its effectiveness cannot be properly derived. Although large organisation are reported to have large financial allocations for CI, these issues consequently effect what is needed by organisations of different structures and contexts to effectively provide skill set requirements to construct a proper and effective CI function within the organisation.

The literature studied for this chapter have contributed to having conceptually informed several parts of the methodology and were the basis in constructing the research instruments used. The most important concept studied here would be the CI process. As discussed in Section 2.5, there have been many versions of the CI process, often referred to as the Intelligence Cycle, and its application have been widely used in many CI-related initiatives in various organisations. Based on most literature, the CI practicing community have accepted the Intelligence Cycle as the axis by which practitioners depend on to construct most CI-related products, be it an ad hoc corporate CI-related initiative, or the structuring of a CI department, or the development of software or technology to be used for CI. However, several, more recent journal articles questioned the validity of the concept, as measurements of its effectiveness have not been researched fully. It has been proposed that each phase of the Intelligence Cycle needs to be re-evaluated of the value it adds to organisations practicing CI. Although the effectiveness of the CI process is currently being questioned by scholars in the field, this research assumed that there are grounds of its effectiveness as many CI-related initiatives that have applied the Intelligence Cycle have produced significant levels of perceived success.

The Key Intelligence Topics process, discussed in Section 2.6, have been employed to place focus on an organisation’s strategic targets, areas of development, and key competitors. After KIT was introduced in 1999, Jan Herring published a short article revisiting KIT regarding problems

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in its uses. In this article, users of KIT criticised that the Herring’s model was hard to implement. Herring defended his model by stating that managers who tried to implement the topics and failed did not have the discipline to properly carry out the proactive interviews required to define the KITs. The author also further commented that others who have criticised his model were apparently inexperienced and unable to endure the process of field research, which is what KIT really is in the context of CI. As a researcher for this research project, it was believed that a field research element was crucial in understanding the research’s environment and contexts. Therefore, Herring’s KIT was used as one of CI concepts as basis in this research’s methodology.

The approach to constructing a categorical system was also studied within the literature. It was one of the objectives of the research to categorise the different types of small and medium-sized firms from a CI perspective. In contrast, the approaches taken by the respective authors in developing taxonomies and typologies allowed the research to produce results related to best practices, which consequently presented a clearer perspective on specific details in the CI practice. This part of the literature study partly approves and validates the taxonomy produced during this research.

All in all, the general purpose of this chapter was to understand the basic elements of competitive intelligence and its origins, backed by CI-related issues, such as past and current practices, covering various implementations and processes, categorisations of CI activities and the types of CI practitioners. A thorough understanding of the concepts and issues allowed the literature review to progress towards specific issues more directly related to the research’s aims and objectives. The following chapter analyses literature pertaining to issues on small and medium-sized enterprises in Malaysia, specifically in the Information and Communication Technology sector, and its implications to CI. Concepts and theories to support and justify the purpose of the research and its respective methodologies are also discussed.

144 Herring, J. KIT revisited: their use and problems. SCIPonline.com, 1(8), 2005.
Chapter 3
Literature Review II
SMEs in Malaysia, Structures and Contexts

3.1 Introduction

The research project specifically sampled MSC-status SMEs in the ICT sector in Malaysia. In 1995, the Malaysian government launched the "Multimedia Super Corridor" (MSC) providing support towards accelerated growth for the ICT industry in Malaysia. This massive and ambitious project structured a path for the future by developing intelligent cities with state-of-the-art information and communications technology infrastructure; tax exemption for companies, which comply to MSC standards and are granted the MSC-status, for 10 years or a 100 percent investment tax allowance, and unrestricted employment of knowledge workers. MSC-status companies from the ICT sector enjoy incentives such as removal of sales tax on computer and components as well as granting of accelerated capital allowance for expenses on computers and other ICT equipments were given to encourage the usage of ICT.

By 2007, the MSC initiative has granted MSC-status to over a thousand companies from the ICT sector and close to 800 of those companies are in the small and medium-size category. The Technopreneur Flagship, one of the eight flagships under the MSC umbrella is by far the largest and the most complex overseeing body in the MSC, whose purpose is to oversee and support the progression of the MSC-status SMEs. One of its approaches is to foster competitive intelligence practice within the SMEs towards being more competitive, with aims of rapid growth and to break into international markets. Over a decade has gone by and the efforts are not without challenges and concerns. One of the main concerns was derived from the MSC's lack of understanding of information needs for support of SMEs to be more competitive. Coincidently, the same problem was stated in a study by Bergeron, for the government of Quebec, along with other governments, whose fostering CI practice within SMEs. This challenge faced by the

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MSC partly justifies the existence of this research and its target sample. This chapter aims to discuss this issue in further detail.

The discussions in this chapter fall into two parts. The first reviews issues on small and medium-sized enterprises in Malaysia in an attempt to define the Malaysian SME for use in the research, and to understand the current situation about companies within the region, specifically in the Information and Communication Technology sector. The second section discusses the topics that pertain more directly to Stage One of the research methodology, covering aspects of structural and contextual characteristics. The chapter concludes with a discussion of implications of these issues to SMEs.

3.2 Defining Small and Medium-sized Enterprises in Malaysia

There has never been a consensus on what criteria should be applied to define a small and medium-sized enterprise in developing countries despite the fact that there is a proliferation of definitions. One study by the Georgia Institute of Technology (and cited by Manuh and Brown\textsuperscript{148}) identified over 55 different definitions in 75 countries. It is noted that most definitions appear to have been governed by the interest of the perceiver, the purpose to be served and the stage of development of the particular country and economic environment in which the definition is to be employed\textsuperscript{149}. It has been observed in the literature that there is a general tendency among empirical researchers is, to define SMEs by their size of enterprise, which are normally measured by either the number of persons employed, or the value of paid capital (and/or fixed assets) or a combination of both. Others use less common methods such as shareholders' fund, value and/or volume of output, sales, turnover, legal status, and capital/labour intensity.

Having acknowledged this, it is important to explore some existing definitions formulated by different government agencies and researchers in Malaysia before establishing the operational definition for the research. Indeed, like other countries, a similar difficulty is felt in considering the definition of SMEs in the country. So far, there has not been a formal, legal or clear-cut categorisation of what ‘constitutes’ the small and medium enterprises in Malaysia. Various


government agencies and institutes have adopted different definitions. This part of the chapter further discusses the differences.

The first example to state is the practice of the Ministry of International Trade and Industry (MITI), which is responsible for licensing the manufacturing establishment of the country, and which has been defining small and medium-sized enterprises differently over time. For instance, under its Industrial Coordination Act (ICA), which was introduced in 1975, all new and existing industrial establishments with more than 25 workers and paid up capital of more than RM250,000 were, required to apply for a new manufacturing license. In 1985, ICA amended its provision to cover establishments with paid up capital to RM1 million and a full-time workforce of less than 50 employees. A year later, another amendment was adopted extending its regulations to establishments with paid up capital of RM2.5 million and engaging 75 full-time employees. The purpose of these amendments is understood to be to allow more small and medium-sized enterprises to operate without having to register with the ICA, and hence giving them more responsibility for their own survival and market conditions.150

Meanwhile, the Coordination Council for Development of Small Industry defined a small firm as one that has fixed assets of less than RM250,000. Recently, this Council was transferred to the Ministry of International Trade and Industry and was renamed the Small-scale Enterprises Division (SSED), which is responsible for coordinating government policies and programmes for promoting the development of small and medium-sized enterprises. It has now classified a small enterprises as having paid capital of not exceeding RM500,000 and medium-sized enterprises as having paid up capital not exceeding RM2.5 million.151 Meanwhile, under the Credit Guarantee Corporations (CGC), a small and medium enterprises is defined as one with having paid up capital that does not exceed RM100,000 for “non-Bumiputras” enterprises (companies that are run and owned by non-native Malaysians and non-Malaysians with limited government privileges) and RM200,000 for “Bumiputra” enterprises (companies run and owned by native Malaysians given government privileges). The National Trust of People (MARA) has also used its own definition, classifying all enterprises with paid up capital less than RM200,000 as being a small and medium enterprises.

It is indeed widely acknowledged that the different definitions of small and medium-sized enterprises serve specific purposes for the respective establishments. In three studies conducted in Malaysia by three international agencies, the World Bank (1984), the United Nations Development Organisation (1986) and the Asian Development Bank (1990), the following definition was adopted:

i. small scale enterprises – establishments employing less than 50 workers;
ii. medium-scale enterprises – those having between 50 and 199 workers; and
iii. large-scale enterprises – enterprises having more than 200 employees.

Some independent researchers have used several other measures to define the small and medium-sized enterprises as those employing less than 50 and below 200 full-time workers respectively. In a study of a specific small and medium-sized Bumiputra entrepreneur in Johor Bharu, Aziz also proposed that small and medium-sized enterprises as having less than 200 employees. On the other hand, Chapham classifies small and medium-sized enterprises in Malaysia as those having a workforce of between 10 and 100 full-time employees. Similar to the definition by Aziz, Salleh has categorised small and medium-sized enterprises as having less than 50 employees and 200 employees respectively (1990, 1991a and 1991b).

Having observed some definitions of small and medium-sized enterprises in Malaysia, the term ‘small and medium-sized enterprises’ in this research refers to a firm that has less than 200 full-time employees, and has fixed assets of less that RM2.5 million.

3.3 SMEs in the ICT industry and Malaysia’s Multimedia Super Corridor (MSC)

The development of ICT usage in SMEs is very much influenced by the overall direction of the ICT industry in Malaysia as well as the advancement of global ICT trends. This is despite the fact that individual enterprises or entrepreneurs, skilled employees, size and resource of individual SMEs, vendors’ support services, type of ICT and type of industry are equally noted to be important in influencing SMEs to utilise ICT\textsuperscript{160}. Structurally, Malaysia is intensifying her efforts to build a strong foundation for the ICT industry to achieve Vision 2020 (a government project for Malaysia to be a fully developed country by the year 2020). To achieve this, the Government of Malaysia launched an ambitious project known as the “Multimedia Super Corridor” (MSC) in 1995. This project provided impetus to the growth of the ICT industry and the country’s economy through a number of benefits, including: development of intelligent cities with ICT and communications infrastructure such as Cyberjaya and Putrajaya areas; tax exemption for MSC status companies for 10 years or a 100 per cent investment tax allowance, and unrestricted employment of knowledge workers. In addition, the National Information Technology Agenda was prepared as a framework in the development of three strategic elements of human resource, infrastructure and ICT-based application in 1996. Incentives such as removal of sales tax on computers components, as well as granting of accelerated capital allowance for expenses on computers and other ICT equipments were given to encourage the usage of ICT. In order to enhance the nation’s move towards ICT-strong foundation, some common laws have also been passed, in line with ICT potential that will be explored in order to reach to the fullest possible levels. These Acts, among others, include the Digital Signature Act 1997; the Copyright (Amendment) Act 1997; Computer Crime Act 1997; Telemedicine Act 1997, and; Communications and Multimedia Act 1998\textsuperscript{161}.

Although the ICT industry is growing fast in line with the government efforts, the industry is also hindered by the shortage of professionals and skilled human resource. During a period of 1996 - 2000, it was estimated that the country’s shortage of ICT staffs reached 7,063, i.e. about 75 per cent of the demand were met, as stated in the Seventh Malaysia Plan 1996-2000\textsuperscript{162}. This means

\begin{itemize}
\end{itemize}
that the surge in demand for ICT skilled workers and professionals is exerting pressure on the supply of ICT personnel especially in the area of networking and Internet. Ideally, high demand for ICT skills has prompted many companies to offer increasing pay to attract these personnel. As in many other countries worldwide, competition for top ICT talents and entrepreneurs becomes tough.

Besides the shortage of human resource, another key challenge faced by the ICT industry is the lack of entrepreneurial talent in ICT. Based on a study recently, lack of entrepreneurial ICT talents impedes the development of innovative world-class technology and products\textsuperscript{163}. This is especially so for entrepreneurs in SMEs. To date, numerous efforts have been implemented to promote ICT applications in SMEs. A RM20 million fund for SMEs to participate in electronic commerce known as The Electronic Commerce Grant Scheme was, for instance, launched in 1999, as well as ICT entrepreneurial development training, infrastructure supports, technical and advisory services etc. The aim is to enable SMEs to integrate themselves into the mainstream of e-commerce, communications, and information technology as well as helping them to find a place to survive in the global marketplace.\textsuperscript{164} This is on top of the Malaysian Government efforts to develop a large project such as Multimedia Super Corridor, to act as a proxy to expand participation of local SMEs into information technology and into advanced techniques in their operation, production, marketing and distribution systems. The efforts are also initiated in order to establish wider business networks between government and SMEs, SMEs and MNCs, and SMEs and SMEs, locally and globally.

3.4 Competitive Intelligence in Malaysian SMEs

In Malaysia, in 2006, firms with less than 200 employees accounted for more than 89 per cent of all businesses, represented 60 per cent of business employment, and 58 per cent of turnover.\textsuperscript{165} Small and medium enterprises have been widely known as an important source of employment and economic development.\textsuperscript{166} According to the Small-scale Enterprises Division, a Division under the Ministry of International Trade and Industry, SMEs demonstrate the greatest job


\textsuperscript{164} Ibid.


creation during economic downturns and contribute the most to job growth during economic expansions.167

Information available to assist small and medium enterprises in assessing the issues directly associated with competitive intelligence is somewhat limited168 but on the rise. More and more concerns over the implications of CI and its application to SMEs have been of growing interest to scholars and practitioners169. However, the majority of CI literature provide a perceivably inexhaustive list of examples and studies of the implementation of CI in large organisation and the organisation of the CI function, the tools, models, and analytical techniques is typically based on multi-person CI, either in a central department or coordinated divisional departments.170 Experiences and insights have been gained within these large organisations with respect to the impact of CI on corporate strategy, tactics, organisational structures, and culture. In other words, the growth and applications of CI within these firms have been successful. However, according to Benjamin Gilad, the growth of CI as a concept seems to be following the wrong foci:171 1) emphasis on systems, 2) prominence of procedures, and 3) attention to workflow details. These are basically the general characteristics of large, bureaucratic companies, which are the hallmark of the successful large firm; however, should not be for the development of the CI concept.172 Gilad further states that while bureaucratisation can work for large-scale standard activities, bureaucratic CI is an oxymoron, and that what is missing from the current CI model is the more ad hoc or innovative element.173 This element may allow for the CI function to be better applied to other business structures, such as small and medium enterprises.

An overall view of the literature relating CI and SMEs is that the lack of scholarly publications had been the result of a common assumption that smaller companies were not practising CI or

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172 Ibid.
173 Ibid.
less likely to use CI\textsuperscript{174}. However, a study by Groom and David, although also concluded that SMEs were less concerned with CI, found some notable differences among companies regarding to the resources allocated to CI activity. For example, SMEs with a greater number of employees were also those that relied on their employees for CI activity\textsuperscript{175}. According to Tarraf and Molz, the reason for the differences in levels of CI usage are due to the character of the decision maker and therefore, significant differences between companies' reliance on CI are expected, depending on attitudes, perceptions, and personalities of the decision-makers at those companies\textsuperscript{176}. However, the authors' contention can be criticised, that their theory can very well be applied in any corporate setting in regards to attitude, perceptions, and personalities, and should not be exclusive to managers in SMEs. Another study, which also proved that the common opinion of SMEs not having means to conduct CI is highly irrelevant, stated that SMEs do not ignore CI, especially during the creation of the company\textsuperscript{177}. In the article, Danet used Nonaka's model of knowledge assets and an informational approach to suggest that related CI practices, which covers factors that affect SME vulnerability, customer intelligence, and its relations to partners and products, prove crucial in developing an SME. Some authors brought alternative CI techniques to replace large company CI, techniques that can be learned and applied by all employees of the SME, rather than designating a CI specialist, or a CI department with costly CI software. Izquierdo and Larreina suggested that Technology Watch (TW) is an invaluable tool used to detect opportunities and menaces at an early stage and facilitate the information to decide and carry out the appropriate strategies. The base of TW is the transformation of scientific, technical and technological information in technical knowledge allowing the enterprises to achieve competitive advantage\textsuperscript{178}. Brouard also suggested a similar approach, environmental scanning, which equips SMEs with an increased and systematic awareness of environmental changes and their inherent risks\textsuperscript{179}.

\textsuperscript{176} Tarraf, P. and Molz, R. Competitive Intelligence at Small Enterprises. S.A.M. Advanced Management Journal, 71(4), 2006, pp. 24-34.
It is not to say that the large company contributions in the CI function are not applicable to SMEs to an extent, as some companies that are categorised as SMEs may share some characteristics and functions of their larger counterparts. However, SME as a universal concept is known to be less predictable, with different approaches in conducting business and tasks depending upon variations in structural and contextual characteristics. To understand the relationship between SMEs and CI, the following discusses the structures and contexts of SMEs and subsequently relates them to the practice of competitive intelligence in SMEs. This section relates to the preliminary assumptions of the research.

3.4.1 Structural and Contextual Characteristics of SMEs

The primary assumption for this research, as stated in Chapter 1, is that the SMEs' approach to CI is largely determined by the variations of its contexts and structures. Also, it is assumed that the SMEs' structures are largely determined by the variety one would find in its environments. For this reason, identifying variations within small and medium enterprises allows proper considerations for planning different approaches for CI within different contextual variety later in the research.

Firstly, the SME is regarded as either an entrepreneurial endeavour or generally, an *ad hoc* company, or possibly a combination of both. The following paragraphs discuss these concepts, where points are taken mostly from an article from SCIP's *Competitive Intelligence Review* by Jean Brandau and Andrea Young entitled, "Competitive Intelligence in Entrepreneurial and Start-up Businesses" and Benjamin Gilad's white paper, "An Ad hoc CI Model or Have We Succeeded? Are We Happy?" from the Fuld-Gilad-Herring Academy of Competitive

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According to Mintzberg et al. the entrepreneurial or simple structure is characterised, above all, by what is not elaborated.\textsuperscript{185} Typically, it has little or no technostructure, few support staff, a loose division of labour, minimal differentiation among its units, and a small managerial hierarchy. Little of its behaviour is formalised, and it makes minimal use of planning, training, and liaison devices. Coordination in the simple structure is effected largely by direct supervision. Specifically, power over all important decisions tends to be centralised in the hands of the chief executive officer or equivalent. Thus, the founder or company leader emerges as the key part of the structure. A simple environment can be comprehended by a single individual, and so enables decision making to be controlled by that individual. A dynamic environment means organic structure: because its future state cannot be predicted, the organisation cannot effect coordination by standardisation.

Contextually, according to Brandau and Young, entrepreneurial ventures experience a unique business culture that cannot be replicated in a large corporate environment.\textsuperscript{186} Founders of an entrepreneurial company begin their business with a high degree of trust and mutual respect for the complementary talents and abilities of each of the team members. The entrepreneurial company usually does not have financial resources to offer high compensation packages and employees often count on long-term gains that are speculative and highly risky. The high level of commitment in entrepreneurial companies is directly related to the amount of responsibilities and project ownership each employee is expected to accept. Due to the low level of financial and staff resources, there is often only one person working on each task. If something is overdue or completed incorrectly, there is little question of responsibility and inefficiencies are often obvious. Also, due to shortage of staff, job boundaries tend to be unclear. As someone has available time, they are expected to take on tasks as needed, regardless of an individual's job description. This cross-pollination of job responsibilities creates for each group member a strong sense of ownership that covers the whole project rather than only one specific piece of the business. Additionally, there is a high level of ambition in the founding group and additions to the


\textsuperscript{185} Ibid.

\textsuperscript{186} Brandau, J. and Young, A. Competitive Intelligence in Entrepreneurial and Start-up Businesses. Competitive Intelligence Review, 11(1), 2000, pp. 74-84.
team are expected to take on high levels of responsibility very early. The personal achievement level of each of the founders can be quite significant regardless of age. Typically, there is a low level of bureaucracy that can lead to rapid and innovative decision-making. Project teams may be very small, allowing all of the members to interact and communicate easily regardless of differences in job titles or company seniority.

According to Mintzberg et al. the ad hoc company is a highly organic structure, with little formalisation of behaviour; job specialisation based on formal training; a tendency to group the specialists in functional units for housekeeping purposes but to deploy them in small, market-based project teams to do their work; a reliance on liaison devices to encourage mutual adjustment, the key coordinating mechanism, within and between these teams. To innovate means to break away from established patterns. So, the innovative organisation cannot rely on any form of standardisation for coordination. Of all classifications of companies, the ad hoc type shows the least reverence for the classical principles of management, especially unity of command. The adhocracy must hire and give power to experts – professionals whose knowledge and skills have been highly developed in training programmes. However, the adhocracy cannot rely on the standardised skills of these experts to achieve coordination, because that would lead to standardisation instead of innovation. Rather, it must treat existing knowledge and skills merely as bases on which to build new ones. Moreover, the building of new knowledge and skills requires the combination of different bodies of existing knowledge. So rather than allowing the specialisation of the expert or the differentiation of the functional unit to dominate its behaviour, the adhocracy must instead break through the boundaries of conventional specialisation and differentiation. In the adhocracy, professionals must amalgamate their efforts, where different specialists must join forces in multi-disciplinary teams, each formed around a specific project of innovation. Managers abound in the adhocracy – functional managers, integrating managers, project managers. The last named are particularly numerous, since the project teams must be small to encourage mutual adjustment among their members, and each team needs a designated leader, a “manager”. Managers become functioning members of project teams, with special responsibility to effect coordination between them. To the extent that direct supervision and formal authority diminish in importance, the distinction between line and staff blurs.

According to Gilad, the *ad hoc* company is formed according to the needs of the project. The relevance of financial and staff resources is only a question of whether the group of experts can be formed or not with the expected compensations. Also, there is less compromise for multiple responsibilities due to the demand for specialisations within the project. Unlike the typical entrepreneurial venture, the *ad hoc* company produces more innovative decisions, and the work assignments to each staff are more distinct in accordance to respective expertise. Similar aspects, however, are the low level of bureaucracy, and that project teams tend to be small, allowing members to interact and communicate easily with low regard for the differences in job titles or company seniority. It should be noted, however, that the entrepreneurial company and the *ad-hoc* company are theoretical concepts, and it is common for small and medium-sized enterprises to experience combinations of both concepts in its structures and contexts.

### 3.4.2 The Implications of Structure and Context to Small and Medium Enterprises

The identification of structural features and characteristics of SMEs is used as a guide for the research to help establish the diversity of small and medium enterprises, and its different practices and general approaches to CI tasks. Entrepreneurial and ad-hoc SMEs are assumed to be found in environments that are both complex and dynamic. Also, it is assumed that each approach by an SME towards CI is unique, and applying standardised CI programmes or tools is insufficient. Adoption of relevant CI expertise, and/ or a flexible CI programme, not standardisation, may be the main coordinating mechanism. It is hypothesised that there would be two possibilities for CI approaches in the entrepreneurial and ad-hoc SME; a) one CI specialist may be hired to handle all CI tasks, including the administration of CI systems, as the ad-hoc CI is based on expertise, not formal authority, or b) there would need to be a CI programme or tool flexible enough to be accessed and used as needed by different levels of staff within the company, where in this case, CI in entrepreneurial SMEs is practiced by all staff during relevant situations. It is to note that approaches by one structure and/or context is not better than another; rather, different approaches to CI are often necessary due to structure and context.

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190 Brandau, J. and Young, A. Competitive Intelligence in Entrepreneurial and Start-Up Businesses. *Competitive Intelligence Review*, 11(1), 2000, pp. 74-84.
According to Dou and Dou, dividing SMEs into segments according to contexts and structures, as discussed above, is necessary and useful in identifying the different practices and general approaches to CI, but beyond these divisions and organisational structures of the companies, the vision of the firm and its areas of development are key factors. When fulfilled, these factors, linked to its respective structures and contexts, may be used to develop various CI facilities within the framework of the company, at the same time, fulfilling the various competitive intelligence steps.

The application of these approaches is to derive variations of CI approaches within different structures and contexts of SMEs. This model was used to select, evaluate, and propose the most appropriate technology tool(s) and user strategies in fulfilling common intelligence needs within different structures and contexts of SMEs. The following paragraphs focused on technologies for competitive intelligence in SMEs.

3.5 Conclusion

The second literature review chapter narrows down the research topic into aspects more directly related to Stage One research. The purpose of this chapter was to gain in-depth understanding of issues surrounding small and medium-sized enterprises in Malaysia, implications of CI to SMEs, and concepts and theories used in the first phase of the research methodology. A higher level of awareness pertaining to these issues and concepts allowed for a more informed approach to research.

Chapter 2 gave a broader view of CI including the identification of the basic elements of competitive intelligence and its origins, past and current practices along with various implementations and processes, as well as the CI-related typologies and taxonomies. In much the same way, this chapter focused on the policies and environmental issues of Malaysia, and the country's relevance to Competitive Intelligence in general. This background study set the stage for an in-depth look at aspects of organisational structure and context.

The technology aspects of CI, including past approaches used to evaluate CI software, as well as methods of evaluating perceived effectiveness of software and systems are discussed in the following chapter.
Chapter 4
Literature Review III
CI Software and Evaluation Methods

4.1 Introduction

Following the previous chapter, which covers Malaysia's background and policies relative to the research, this chapter focuses on the technology and software perspectives of CI for SMEs. Parallel to Stage Two of the research, the following four-part section report the study of literature related to software for competitive intelligence, as well as evaluation methodologies considered for the latter part of research project. The first section of this chapter collected literature pertaining to an overall view of issues in CI technology, which puts in perspective the roles of technology for competitive intelligence accessible to SMEs. Further implications and relevance of these issues to SMEs were subsequently discussed. This is followed by a preliminary study of CI software, elaborating on its underlying features and capabilities, and a critical review of past CI software evaluation methods. The third section critically reviewed past approaches applied in evaluating CI software, differentiating them with the approach used in the research and the value they bring to SMEs. The final section discussed Davis' Technology Acceptance Model (TAM), which was used at the end of the research project to evaluate the perceived effectiveness of software recommendations based on the research's evaluation study.

4.2 The Role of Technology for Competitive Intelligence in SMEs

One of the critical success factors for firms of any size that are considering the implementation of a CI function, or the augmentation of existing CI process, is to ensure that sufficient resources are applied to supporting the technical infrastructure. High performance networks, the Internet, and new application software provide useful tools for the CI professional. To support this, a study by Maguire et al. stated that there is sound evidence that SMEs can gain competitive advantage
through the use of ICT\textsuperscript{193}. An earlier study in UK by Oftel in 2000 shows that the use of the Internet by SMEs has grown in the past four years. Member companies with 1 – 50 employees, and those with 51 – 500 employees, are connected to the Internet at rates of 48\% and 86\% respectively\textsuperscript{194}. While the study defined Internet connection in broad terms and did not indicate how the connectivity was used, it indicated that there had been a recognition and subsequent adoption of the Internet as an important business tool for SMEs.

The Internet is one of the important elements in the CI toolkit for the gathering and dissemination of information. The top three reasons for Internet use by businesses are: to improve the quality of CI (70 per cent); to increase the cost effectiveness of acquiring, disseminating, and using internal information (58 per cent); and to add value to existing products and services (55 per cent)\textsuperscript{195}. Interestingly, Graef's study also indicated that attitudes of a surprising percentage of senior management (38 per cent) toward the Internet were indifferent or negative. Senior management commitment and support should be required not only in the CI program itself, but also within its component parts.

A review of the CI literature reveals a number of important findings with respect to the contribution of well-designed information systems. A 1998 study discussed the linkages between CI, business change, and IS support effectiveness\textsuperscript{196}. Guimaraes and Armstrong demonstrated that firms that possessed above-average effectiveness of their information systems were also those firms that were highly effective in implementing business change. Firms with above-average CI effectiveness also had a significantly higher level of business-change effectiveness than did those firms demonstrating below-average CI effectiveness\textsuperscript{197}. Finally, those firms with both CI and business-change effectiveness also had an above-average level of information-system-support effectiveness\textsuperscript{198}.

\textsuperscript{197} \textit{Ibid}.
\textsuperscript{198} \textit{Ibid}.

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There are a number of tools available to all staff within a firm that will enable the adoption of Cl application software. The basic assumption made here is that all staff involved in the Cl function are equipped with workstations connected to the network. Those who travel are equipped with notebook computers, and every employee has access to e-mail and other corporate databases from anywhere that the Internet can be accessed. Technologies that support teams, when used as a primary communications vehicle, enable the building of team memory and provide a repository of shared records. Team members know where the information needs to be routed (or where the Cl application is configured to route the information) and where to locate information. A well-structured store of information enables efficient access and distribution of information to team members.

One of the key developments to emerge in the marketplace over the past decade is that of groupware technologies such as Lotus Notes/Domino and Microsoft Exchange. The groupware concept was put forward by Lotus Corporation in the mid-1980s as a means to consolidate applications and functionality under the broad umbrella of communication and collaboration, bringing them together as a set of services. Groupware has evolved over the past decade from basic communication and collaboration, to workflow engine supporting business-process reengineering, to web server and publishing format, and finally, to support knowledge management. The key goals of the CI database(s) and software are: to provide a rich application environment for the end-users that supports any document and data-type; to enhance the collection and dissemination of information and knowledge through the organisation; to support existing business workflow; to have sufficient flexibility to adapt new and evolving business models; and finally, to provide integration with other key elements of the corporate information technology infrastructure and data.

Commercially available CI applications include such features as support for the majority of PC file-types, searching capabilities, and replication. The future of CI applications is seen by various authors to include the following:

- The ability to integrate intelligent agents that will automatically search user selected websites that provide a mechanism to regularly monitor secondary sources\textsuperscript{203}. This will reduce the amount of time that can sometimes occur in Web searches\textsuperscript{204}, and in undirected and informal viewing.
- The inclusion of workflow capabilities into the CI application\textsuperscript{205}. Ideally, the workflow should be sufficiently configurable so that business rules can be embedded and modified within the CI application to best reflect the organisational practices of the firm.
- The CI software should include a feedback mechanism from anywhere within the application\textsuperscript{206}. This will enhance the usability of the CI solution in the short run and assist with the long-term success of the CI infrastructure through ongoing involvement of the users.
- The use of configurable agents, which will provide a mechanism to monitor corporate response for CI services, including research and analysis\textsuperscript{207}.
- Support for on-line, real-time collaboration of CI professionals. For example, technology such as Sametime from Lotus will allow for synchronous collaboration. Any connected person within the name and address book of the firm (this includes customers, business partners, suppliers, and staff) with the Sametime software can collaborate in real-time via the messaging backbone (local area network [LAN], Internet, Intranet)\textsuperscript{208}.
- The capability to integrate with document-management systems\textsuperscript{209}.

It is common knowledge that today's technology continues to evolve at a rapid pace. The features itemised above can already be implemented using technology available today. The challenge for most SMEs is that they may lack the necessary technical expertise to integrate various technologies in a cost-effective manner.

Information is not a panacea. As mentioned before in Chapter 1, it is important to distinguish between a technology that will enable business processes from the people who will make a well-designed business process work. Prince further states that effective CI includes the knowledge of how to gain rapid access to information, and that technological excellence alone is insufficient for business success. Information systems must learn to collect and distribute intelligence through all media, including voice mail, e-mail, and groupware. Getting actionable intelligence into the hands of users so that they can take action is one of the critical success factors of the CI function. The contemporary business environment is characterised by unanticipated events, fluctuations in the global financial markets and changes in technology, and the sudden appearance of new, non-traditional competitors. Clearly, technology infrastructure plays a pivotal role in supporting all corporate functions and can enhance team interaction, collaboration, and information and knowledge sharing.

From the perspective of SMEs, the continued advancements of information technology are accompanied by ongoing reductions of the capital cost to acquire relatively sophisticated hardware and software. The cost for data storage, manipulation, and transmittal is falling, and the boundaries of what is feasible are expanding. Therefore, accessible technologies for supporting the technological infrastructure to conduct CI in SMEs are becoming more readily available. The following section gives an overview of three CI-ready software tools in terms of features and functionalities.

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4.3 CI Software Tools

The development of competitive intelligence emphasises the fact that information retrieval, management, analysis, and understanding are a few of the key steps in a firm's decision making\(^{214}\). However, when applied to SMEs, it is obvious that the diversity of small and medium companies will necessarily give rise to different practices and approaches. Furthermore, when competitive intelligence is focused on the development of new products or new services, the link between information and innovation is strong. Therefore, this section of the literature discusses, in fair detail, a sample of software tools for competitive intelligence taken from the Fuld & Company's 2002 Intelligence Software Report\(^{215}\), highlighting its main features and functions, which may be applicable in supporting small and medium enterprises in acquiring and organising relevant competitive information.

*Intelligence v1.0*

Brimstone's *Intelligence* is a relational database modeled upon the five-step Intelligence Cycle. In essence, the software affords a means of identifying relationships between products, companies and persons. It also enables a comparison among different products and companies. The product provides a structured framework through which the user can collect information and categorise it along three principal lines: companies, persons and products. Information under each of these three headings is further stratified along a series of sub-categories. The Companies category is comprised of some 12 sub-topics such as Organisation, Finance, and Technology. The Persons and Products categories have 8 and 7 sub-topics respectively. Each sub-topic entails a further set of parameters. For example, the Relations sub-topic under the Products category consists of 10 parameters: Distributors, Developers, Inventors, Importers, Exporters, Experts, Competing Products, Complementing Products, Producer, and Implementer. Brimstone's Intelligence does not possess its own search engine for collecting information. Rather it possesses a text analyser that may be activated by right-clicking whenever the user is searching the Internet. The text analyser will then scan the document against a set of key terms to determine if it is of relevance to the user. It will then suggest how the document should be categorised. The text is scanned against a set of built-in and user-defined terms. The user can then establish a link to the document or


manually enter its contents into the database. Information within the database can then be analysed with the help of two analytical tools: cross-tab analysis and network visualisation. Cross-tab analysis allows the user to compare a series of persons, products or companies along a specified set of parameters. Network visualisation allows the user to identify relationships between persons, companies and products graphically along a number of possible linkages. The insights gained through cross-tab analysis and network visualisation can then be distributed through a variety of reporting formats. Management of the collection, analysis, and distribution functions is facilitated by an activity list that allows the user to track the status of each CI-related task. In short, Brimstone's Intelligence affords the user a means of addressing all the steps of the intelligence process.

Knowledge.Works

Cipher's Knowledge.Works was designed from the ground up as a CI application. The program is integrated directly into Lotus Notes or Microsoft Outlook, so users can check their e-mail and access the application from the same program window. By embedding the application within the e-mail program, users are literally one click away from obtaining new intelligence. Knowledge.Works augments the CI process by modelling the intelligence workflow and by automating the collection of information. The software is divided into three distinct sections: Create Knowledge, Written Documents, and Human Documents.

- Create Knowledge: The workflow component of Knowledge.Works is centred on Key Intelligence Topics (KITs). Clicking the 'Create Knowledge' button opens a navigation bar that lists links to current, finished, and requested KITs. An intelligence topic is typically broken down into Key Intelligence Questions (KIQs) that, when answered, will lead to a complete analysis of the topic. The software lets users track the intelligence topics from their inception to resolution, while empowering the 'champion' (the manager charged with addressing the KIT) to assign people to each of the underlying questions. Any supporting evidence that is gathered while answering the KIQs is recorded on the page for the intelligence topic. The final report can be seen as either a simple, one-paragraph answer to the KIT or as a detailed page containing all the intelligence questions and supporting evidence collected to formulate the final analysis. Knowledge.Works also allows users to evaluate the value and accuracy of the KITs after they are completed.
• Written Documents: By employing Web crawlers to scan the Internet and news feeds, Knowledge.Works provides a comprehensive solution for collecting published information. Users can begin receiving content from a number of pre-designated sources out-of-the-box, and the system can be customised to pull information from other sources that are relevant to a company's industry and needs. The Written Documents section contains all the pages with published information gathered from the Internet and internal databases. Some of the information, such as company profiles, is input manually while other entries, such as news, can be entered either by a person or a news-feed crawler. Knowledge.Works essentially provides a document repository where the user can either browse or search through the collected items. The documents are stored in a Notes container for the Lotus version or in a public directory for the Microsoft version. If a written report is deemed relevant to answering an intelligence question, the user can click the 'Assign to KIQ' button and place a link to the document under the 'KIQ Evidence' section of the appropriate intelligence question. The 'Office Documents' link opens a page containing all the internal documents written by employees for the purpose of intelligence. Users can launch any Microsoft Office application from that page and, after writing a report, save it directly into the directory. To organise the collected documents, Cipher gives customers the option to purchase IBM's Intelligent Miner for Text at an additional cost. Intelligent Miner for Text can be seamlessly integrated into Knowledge.Works and can dynamically generate a taxonomy that is then applied to categorise incoming documents.

• Human Documents: Knowledge.Works facilitates the collection of primary information in the Human Documents section of the application. Employees can post any competitively pertinent information they have heard through a message board set up as a discussion forum. A section for contacts lists all the relevant people with their professional, personal, and contact information. There are also pages where users can enter and retrieve field reports and interview transcripts. As with the written documents, any relevant information can be linked to a Key Intelligence Question.

• Search: The Lotus Notes version of Knowledge.Works employs Lotus' advanced search tool for document retrieval. Furthermore, the Lotus version gives the user the capability to search the Internet from Knowledge.Works. The Microsoft Exchange/Outlook version of the application integrates Microsoft's SharePoint technology into its search capabilities, which can intelligently rank the relevance of retrieved documents differently depending on each individual user's profile and needs. It also allows for easier
monitoring of external websites than in previous versions of Knowledge.Works. These functions stemming from the SharePoint technology are only applicable to the Microsoft Exchange/Outlook version of this application.

Knowledge.Works allows users to personalise the information they receive through e-mail. Users can add keywords, competitors, consumers, and the types of information (KITs, news, etc.) in the 'Administration' (in Outlook) and 'My Profile' (in Lotus Notes) sections to ensure that only the information relevant to each user is sent out when new data is being input.

**Strategy! v2.5**

Fuld & Company's Software Report concluded that Strategy! was the overall best CI application among the 13 evaluated. At a considerable US$1000 per user, Strategy! is a tool for organising and structuring information in a manner that 'slices and dices' tactical and strategic information from a variety of sources, to facilitate strategic and tactical analyses. It allows the user to produce a wide array of reports that can be disseminated in a variety of ways. The software was designed as a relational database tool for the competitive intelligence community, with a special focus on comparative assessment and reporting. Strategy! provides users with a range of options for comparing companies, products, and other defined parameters. As with most software packages designed for CI, Strategy! models several steps of the Intelligence Cycle. It does not automatically collect information, but rather provides user-defined categories that must be filled by the CI team members through their own research and filtering efforts. In doing so, Strategy! can be used as a guideline for determining what types of information need to be collected to facilitate the CI process. When structuring the database, users must determine the industry profile of their particular business. Users determine what areas of the extensive database they want to use. There are many factors that could be tracked and analysed, including companies or any other entities in the user's competitive environment, key people, products, services, industry trends, product or service classifications, distribution regions, economic regions, sales channels, market segments, and source records. At each level, Strategy! guides the user to the most important nuggets of information that can be useful for tactical or strategic analysis. For example, the company record details of all the information relevant to a specific company, such as financial information, ownership, and location. People records profile an individual's education, work

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experience, and philosophy of key people in each organisation. Product records detail specific strengths, differentiation, and selling points against each competing product. Industry records capture general changes or intricacies in the market, while source records detail the sources from which the information was obtained. Many fields can be modified to reflect the user’s unique needs, and the user only needs to fill out those categories which are important to his or her tactical or strategic goals. The resulting pool of data provides the basis from which subsequent competitor and product comparisons are produced.

4.4 CI Software Evaluation

During the past 30 years, there have been many studies on evaluating the quality and effectiveness of software, including in the areas of software engineering, human-computer interaction, and information management. Research in these fields has generated a large body of literature promoting either systems-oriented methodologies (with a focus on the software’s performance and technical features) or user-centred methodologies (with emphasis on how users interact with the software and how they perceive their outputs). Generally, it is agreed that there is a need to use a variety of innovative methodologies when evaluating software and retrieval systems.

Systems-oriented methodologies refer mainly a study of information system efficiencies in terms of recall and precision. These studies focus on the measurement of relevance, or the “subject relatedness” and “the utility” of a record for a given user. The idea is to assess what can be retrieved from a system or database (recall), and to what extent the results are relevant from a subject perspective and/or a user perspective (precision). “Recall” is the ratio that indicates the number of relevant records existing in the database or the capacity to retrieve relevant documents, while “precision” is the ratio of relevant records retrieved in relation to the total number of records retrieved, or the capacity to avoid the retrieval of non-relevant documents.

221 Ibid., p. 45.
of these measurements lies the notion of relevance and how relevance judgements should be established, either with real users or with computational techniques that anticipate users' judgements.

User-oriented studies, currently dominated by the field of human-computer interaction (HCI), examine the performance of systems in relation to users' characteristics, knowledge, needs, and information seeking behaviour\(^{222}\). The field of HCI has generated much interest in assessing the usability and acceptability of software applications. In turn, a series of ISO standards (as promoted by the International Organisation for Standardisation) have been developed. This type of evaluation is useful, for instance, to improve interface, the capacity of the software to be customised (both in terms of functions and interface), and to better document the help function.

Although both systems-oriented and user-oriented methods are useful in the evaluation of retrieval software, the research stands by the notion that these methods are not helpful for evaluating commercial products for CI because the purpose and context of CI is not taken into account. Before going further, the following paragraphs review past evaluation studies for CI software.

4.4.1 Past CI Software Evaluation Methods

There have been a few schemes for evaluating the value of CI software. Possibly the most referred to of all CI software evaluation studies is the annually published Fuld & Company's Intelligence Software Report. According to the authors of the 2008-2009 Report, since it is already concluded that software cannot address all the requisite functions for a full CI process, the study aimed to evaluate the products in relation to how the technology can reasonably support each step of the CI Cycle (Intelligence Cycle)\(^{223}\). The following describes Fuld & Company's evaluation framework, which primarily outlines the technical criteria in assisting each category of the five-step Intelligence Cycle\(^{224}\):

1) **Planning and Direction:** On a five-point scale, the software packages were scored based on the ability of the products to fulfil the following function:

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\(^{224}\) Ibid.
• Providing a framework to input Key Intelligence Topics (KITs) and Key Intelligence Questions (KIQs) into the system.
• Receiving CI requests from employees within the company and in the field.
• Managing a CI work process and project flow that allows collaboration among members of the CI team as well as the rest of the company.

2) Published Information Collection: According to the authors of the Report, apart from online search, a true secondary search covers a wide range of sources, many of which are not available online. The authors further stated that even with the best search engine technology, the search may need an information professional, or a searcher who is familiar with the technology or industry specialty.

The scoring in this section was contingent on the level of functionality provided by a software tool and, to a lesser extent, the ease of use and general quality of the application. Since software can greatly enhance this step of the Intelligence Cycle, the products were judged on a plethora of criteria including:

• Internal search of multiple information repositories, such as databases, Microsoft Office documents, company reports, visual objects (maps, graphs, and drawings), e-mail, and intranet discussion boards.
• External search of web-based sources, such as direct document search (HTML and XML files), message boards, and databases. The ability to conduct meta-searches, where a single query can be sent to multiple Internet search engines and the ability to search across multiple languages was also considered under this criterion.
• Comprehensive search customisation, with queries based on words, phrases, concepts (such as KITs), dates, and other refined search capabilities.
• Track changes in monitored websites.
• Web-crawling using a ‘spider’ application based on pre-defined user queries.
• Dynamic retrieval and storage of secondary information.
• Automatic filtering of collected information based on user-defined criteria, such as KITs, competitors, source, geography, priorities, dates, key players, products, business units, and industry.
• Relevance ranking and validation of retrieved documents.
• Dynamic summarisation of articles and documents.
• Automatic categorisation of collected information based on aforementioned user-defined criteria.
• Ability to catalogue, bookmark, and archive collected documents both dynamically and manually.

3) **Primary Source (Human Intelligence) Collection:** In his seminal work *Competitive Strategy*, Michael Porter highlighted the importance of gathering information from people rather than from published sources, "...Researchers tend to spend too much time looking for published sources and using the library before they begin to tap into field sources. The researcher should not exhaust all published sources before getting into the field."\(^{225}\) While a software package cannot conduct interviews to obtain information, it can effectively catalogue and index information previously entered onto an internal system, such as a sales call reporting database. Here, the collection of human intelligence was judged primarily on three functions:

- The ability to capture qualitative, 'soft' information from employees throughout the company, either through internal message boards, e-mail, or another easily accessible medium by which primary information can be inputted and retrieved.
- The capacity to target and retrieve qualitative information (such as consumer feedback) from message boards, news groups, and other external forums.
- An area in the software and user interface for inputting interviews, field reports, and other first-hand accounts.

4) **Analysis and Production:** To reflect the paramount importance of Analysis in the CI process, this category was assessed on a 15 point scale, which may be somewhat ironic due to a previous statement by Leonard Fuld that Analysis cannot be augmented by software\(^{226}\). With that, the following were the evaluation criteria in supporting this step in the Intelligence Cycle:

- The ability to sort information by user-defined rules.
- Data visualisation interface(s) to sort and view collected information.
- Multiple viewing models, such as SWOT (Strength, Weaknesses, Opportunities, and Threats) and Porter's Five Forces model\(^{227}\).
- Display of information in chronological order.
- Extraction of relationships between people, places, dates, events, and other potential correlations.

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• Text-mining technology to locate and extract user-defined variables.
• The ability to relate analyses to quantitative data.

5) Report and Inform: Underlying all delivery of intelligence is the individual's ability to convince the decision maker that a certain conclusion, or strategic position, is correct and actionable. Typically, software can deliver information but it cannot convince a decision maker. Despite this limitation, software can play an important role in getting the right intelligence to the right person in time to make a decision. The following were the functionalities that software with dissemination functions was evaluated against:
• Both standardised and customisable report templates.
• The ability to link and export reports to Microsoft Office formats, CorelDraw, Adobe PDF, multimedia formats, other databases, and/or other reporting systems.
• The capability to deliver reports via hard copy, the corporate intranet, e-mail, and/or wireless sources.

Within a similar context, Chamberlain and Davies had also developed an equally comprehensive framework to evaluating CI software. Their framework for evaluation also used a rendition of the Intelligence Cycle as a basis towards building a simplified framework for identifying and evaluating where technology can have significant impact. Building on this idea, the authors developed a basic categorisation of technology by classifying the products according to how many process steps the particular topic covers. As such, the products are classified on a scale from point solutions (products that only cover one phase of the Intelligence Cycle) to broad CI application suites. Each product is then analysed against a series of common criteria and functionalities divided according to the Intelligence Cycle. The product is to be evaluated according to section(s) of the outlined criteria, depending on the comprehensiveness of the software. The following table itemises the software evaluation criteria developed by Chamberlain and Davies.

231 Ibid.
Table 4.1: Chamberlain and Davies' Software Evaluation Criteria

<table>
<thead>
<tr>
<th>General Technology</th>
<th>Programming required</th>
<th>Total Cost of ownership (TCO)</th>
<th>Licensing</th>
<th>Maintenance</th>
<th>Training required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
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<td>Ease of Use</td>
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<td>Learning Curve</td>
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<td>Scalability</td>
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<td>Ability to customise</td>
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<td>Internal search:</td>
<td>Internal databases</td>
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<td>Office documents</td>
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<td>Graphical data</td>
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<td>E-mails and bulletin boards</td>
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<td>Internal search:</td>
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<td>Web sites</td>
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<td>Message boards</td>
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<td>External search</td>
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<td>Customised search interfaces</td>
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<td>Boolean search, phrases and concepts</td>
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<td>Web crawling via intelligent agents (spiders)</td>
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<td>Dynamic retrieval and storage</td>
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<td>Automatic filtering based on profiles</td>
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<td>Relevance ranking and validation</td>
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<td>Dynamic summarisation</td>
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<td>Automatic categorisation</td>
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<td>Catalogue, bookmark and archive</td>
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<th>Delivery</th>
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<td>Standardised and customised report templates</td>
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<td></td>
<td>Link and export reports to multiple formats</td>
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<td></td>
<td>Deliver reports via paper, HTTP, e-mail or wireless</td>
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According to Craig S. Fleisher, any solutions vendor will be able to demonstrate how their software meets the criteria they set out in their promotional materials, and that, usually, the criteria they fail to specify are often far more important than the criteria they include\(^{232}\). To help remedy this common shortcoming, the author had organised the key criteria for evaluating CI software into these categories: system usability, CI functionalities, financial and implementation considerations. The following will discuss these criteria in more detail\(^{233}\):


\(^{233}\) Ibid.
System Usability

1) **Ease of Use:** Here, Fleisher stresses that solution developers are to balance the requirement to provide the most effective and comprehensive solution while still maintaining a simple and easy to use package.

2) **"Out-of-the-box" Functionality:** This simply means that an important feature of any CI solution is for the user to be able to start using the system almost immediately without days or weeks of configuration and a regular need for expert assistance from the IT department. To this extent, the author states that each software package should be evaluated on the ease in which databases can be created, new data integrated and meaningful analysis performed.

3) **Intuitive Navigation:** This section stresses that entering and editing information into the system should be simple; report creation and analysis should flow logically out of the data entry process; and, help should be context sensitive and concise.

4) **Look and Feel:** Although this category is subjective, Fleisher stated that it is nonetheless important. The importance of this category lies in its interface and the reports it produces, where icons should convey the meaning of the function, while reports should be attractively professional.

Intelligence Functionalities

As in the previous review of evaluation methods, this section also uses the Intelligence Cycle as the basis for evaluating software functions. According to Fleisher, no solution has yet provided full effectiveness and efficiency across all phases of the intelligence process, and many systems were designed expressly to be superior on one or two of the phases in particular, that typically being the data collection and dissemination phases. The following briefly describes the Fleisher's summary on the Intelligence Cycle and software functionalities:

1) **Planning:** During this phase, the software can provide the overall "big picture" coordination to allow the intelligence efforts to be coordinated between many resources and to track otherwise unobserved relationships between data.

2) **Collection:** Synonymous with Fuld & Company's Report, Fleisher stated that the collecting and organising of information is the primary area where intelligence software has traditionally focused. For this phase, a good software should allow for inputting of information from various sources including: e-mail, electronic documents, paper documents and storable information, and in this case the software should provide some reference to the physical location of the document. The software should also have
facilities to summarise and categorise the information once it has been gathered to facilitate better analysis.

3) Analysis: Also in agreement with Fuld & Company’s Report, Fleisher declared that the analysis of gathered information has been the weakest area for CI software. Currently, what the best software can generally do is to provide better ways to visualise information and relationships.

4) Disseminate and Evaluate: During this phase, Fleisher stated that this function should only retrieve pertinent information to be included in the report, which is likely to be done in a non-CI application, such as desktop office programs. Having the ability to publish reports in HTML format is also a desired feature, due to companies moving to an intranet strategy.

Financial Considerations
In this section, the key component of the evaluation process for CI solutions is the cost involved in setting up the system. It is likely that, in the context of SMEs, this component will be highly considered to be highly important.

1) Software: According to Fleisher’s article, the cost of the software is to be evaluated both for a single-seat setup as well as for a multi-seat environment.

2) Hardware: Here, the hardware costs are to be estimated and ranked based on the system requirements specified by the manufacturer. Fleisher recommends that consideration needs to be given to resource allocation for any special hardware beyond the standard desktop system that may be required to run the software effectively.

Implementation Considerations

1) Integration/Customisation Cost: This category considers that some companies may want their CI application to be integrated to their current systems infrastructure, requiring certified systems integrators to work with them in customising the software to exact specifications, while some companies want the “out-of-the-box” CI software that can be customised by the end user. The consideration also involves the issue of systems maintenance.

2) Training: This section determines the estimates of the total resource costs, both in terms of vendors and the purchasing organisation, required to train employees on the use of the system.
In 2004, Bouthillier and Shearer outlined an evaluation framework for CI software from an information science perspective. They utilised a six-step intelligence cycle (discussed in Chapter 2), which is integrated to structure the evaluation process. The elements in the Intelligence Cycle were translated into criteria to develop a series of evaluation questions, with particular reference to value-added aspects. As with the criteria, the questions target a software application’s to each step in the CI process. The following table shows the evaluation questions matched up with their corresponding criterion. According to Bouthillier and Shearer, the criteria and questions here reflect the current state of technological development and seek to examine what can be done automatically by an application, or whether the application facilitates the task allowing for the user to do it manually\(^\text{234}\)

<table>
<thead>
<tr>
<th>Evaluation Criteria: Value-Added Processes</th>
<th>Evaluation Questions</th>
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<tbody>
<tr>
<td><strong>I. Identification of CI needs</strong></td>
<td></td>
</tr>
<tr>
<td>1. Identification of main CI client communities</td>
<td>Does the application help to identify the main CI client communities?</td>
</tr>
<tr>
<td>2. Identification of CI topics</td>
<td>Does the application help to identify CI topics?</td>
</tr>
<tr>
<td>3. Translation of intelligence topics into specific information requirements</td>
<td>Does the application help to identify the pieces of information required to address the CI topics?</td>
</tr>
<tr>
<td>4. Identification of CI analytical techniques</td>
<td>Does the application help to identify CI analytical techniques to address the needs of the CI clients?</td>
</tr>
<tr>
<td>5. Capability to change CI topics and analytical techniques</td>
<td>Can the topics and analytical techniques be changed?</td>
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<tr>
<td><strong>II. Acquisition of competitive information</strong></td>
<td></td>
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<tr>
<td>6. Identification of external information sources</td>
<td>Does the application help to identify external information sources?</td>
</tr>
<tr>
<td>7. Identification of internal information sources</td>
<td>Does the application help to identify internal information sources?</td>
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<tr>
<td>8. Identification of sources for specific topics</td>
<td>Does the application relate information with specific topics?</td>
</tr>
<tr>
<td>9. Monitoring content within information sources</td>
<td>Does the application have the capability to monitor content changes within information sources? (e.g., message pop ups to inform about changes)</td>
</tr>
<tr>
<td>10. Monitoring of information sources</td>
<td>Does the application have the capability to monitor changes regarding information sources? (e.g., message pop ups to inform about new addresses, address changes, addresses deleted)</td>
</tr>
<tr>
<td>11. Targeting of information within sources</td>
<td>Does the application have the capability to find specific pieces of information in particular sources? (e.g., running specific queries in pre-selected courses)</td>
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<tr>
<th>No.</th>
<th>Feature</th>
<th>Question</th>
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<tr>
<td>12.</td>
<td>Filtering of information</td>
<td>Does the application have the capability to filter information to meet minimal CI needs? (e.g., highlighting search terms, summarising articles)</td>
</tr>
<tr>
<td>13.</td>
<td>Altering of information</td>
<td>Does the application have the capability to notify users about new information? (e.g., push technology)</td>
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<tr>
<td>14.</td>
<td>Importation of information</td>
<td>Does the application have the capability to import information in different formats? (e.g., HTML, PDF, Excel, Word, PowerPoint files)</td>
</tr>
<tr>
<td>15.</td>
<td>Screening of information</td>
<td>Does the application have the capability to screen out redundant or repetitive information?</td>
</tr>
<tr>
<td>16.</td>
<td>Rating of information</td>
<td>Does the application have a function for rating the qualitative value of information?</td>
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<tr>
<td></td>
<td>III. Organisation, storage, and retrieval</td>
<td></td>
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<tr>
<td>17.</td>
<td>Indexing</td>
<td>Does the application offer an indexing function?</td>
</tr>
<tr>
<td>18.</td>
<td>Hierarchical linking</td>
<td>Does the application allow for hierarchical links?</td>
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<tr>
<td>19.</td>
<td>Cross-topic linking</td>
<td>Does the application allow for Cross-topic linking?</td>
</tr>
<tr>
<td>20.</td>
<td>Storage of a variety of formats</td>
<td>Does the application store a variety of formats?</td>
</tr>
<tr>
<td>21.</td>
<td>Internal searching</td>
<td>Does the application offer an internal search facility?</td>
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<tr>
<td>22.</td>
<td>Browsing</td>
<td>Does the application allow for browsing?</td>
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<tr>
<td></td>
<td>IV. Analysis of Information</td>
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<tr>
<td>24.</td>
<td>Variety of CI analytical techniques</td>
<td>Does the application offer a variety of CI analytical techniques? (e.g., three or more types of techniques, basic company profiles not considered here)</td>
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<tr>
<td>25.</td>
<td>Level of analysis</td>
<td>Does the application allow for varying levels of analysis?</td>
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<tr>
<td>26.</td>
<td>Synthesis of information</td>
<td>Does the application synthesise (summarise) information in any way?</td>
</tr>
<tr>
<td>27.</td>
<td>Recommendations for action</td>
<td>Does the application result in recommendations for action?</td>
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<tr>
<td></td>
<td>V. Development of CI products</td>
<td></td>
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<tr>
<td>28.</td>
<td>Variety of formats for viewing CI products</td>
<td>Does the application offer a variety of formats for viewing the final product?</td>
</tr>
<tr>
<td>29.</td>
<td>Effectiveness of formats</td>
<td>Are the formats effective in conveying CI?</td>
</tr>
<tr>
<td>30.</td>
<td>Flexibility for adapting CI products</td>
<td>Can one format be easily adapted to another format?</td>
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<td></td>
<td>VI. Distribution of CI products</td>
<td></td>
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<tr>
<td>31.</td>
<td>Capacity for distributing CI products</td>
<td>Does the application offer a function for distributing intelligence?</td>
</tr>
<tr>
<td>32.</td>
<td>Identification of potential CI consumers</td>
<td>Does the application help to identify potential CI consumers in the light of particular CI products?</td>
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In summary, the first three evaluation methods are similar in many aspects, and that the differences lie only in the level of detail and comprehensiveness in evaluating the software's functionality, usability, and supporting aspects. Bouthillier and Shearer's evaluation framework, however, is somewhat different as it is based on a re-developed version of the Intelligence Cycle that integrates information-processing elements – information production, seeking, retrieval, and use – which, according to Bates, make up the intellectual domain of information science\(^{235}\). As stated in the last chapter about Bouthillier and Shearer's well-received version of the Intelligence Cycle, this makes their evaluation framework the only one based on a process from the information discipline. So far, however, there still has not been an evaluation method for CI software tested in the context of small and medium-sized enterprises, which would be an attribute of this research. As software for competitive intelligence comes in a growing variety, to cater for the different needs of different types of companies and users, it is quite appropriate to suggest that software evaluation methods move to the next level where specific evaluation approaches are used by different segments in the CI market.

### 4.4.2 Davis' Technology Acceptance Model (TAM)

As discussed above, studies on CI software are quite accessible, however, none of which even mentioned, let alone tested their outcomes to find out whether or not prospective users may be able to accept the software available for CI. According to Tullis \textit{et al.} lack of user acceptance is a significant impediment to the success of new information systems\(^{236}\). Therefore, one of the objectives of this research is to bring the outcomes of the software evaluation study back to the prospective users from within the targeted sample and test their perception of effectiveness against their roles in their respective companies, as well as environments.

Much of previous work pertaining to user acceptance and perceived effectiveness comes from the field of Management Information Systems (MIS), where research seeks to predict how users in an organisation will react to new technologies. And many of these models developed for the purpose of studying user acceptance of information systems had been developed based on a model from the field of psychology, called the Theory of Reasoned Action (TRA), developed by Fishbein


Ajzen. Other tests specifically designed to assess aspects of usability, where its validity and/or reliability have been established\textsuperscript{237}, consist of variables that lean towards testing users' level of satisfaction to software, information systems and technologies, which strays from the research's respective objectives. One of the models derived from Aizen, Davis' Technology Acceptance Model (TAM), which also happen to be the most cited usability model in literature (Figure 3.1)\textsuperscript{238}, was developed to predict information system acceptance and diagnose design problems before users have experience with a system. TAM predicts user acceptance of any technology is determined by two factors: perceived usefulness and perceived ease of use.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{tamb.png}
\end{figure}

As illustrated above, the TAM includes two main constructs: perceived usefulness and perceived ease-of-use\textsuperscript{239}. Usefulness and ease of use are both believed to be important factors in determining acceptance of software. According to Davis, the scales of both constructs demonstrate a high degree of test-retest reliability. From this platform, these two constructs were thought to be of paramount importance in this study. There is considerable interest in human factors of systems due to the recognition of how poorly designed many current systems are and

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the wish to produce design and implementation guidelines that foster computer technology acceptance. Therefore, in order to produce proper feedback based on perception of effectiveness, there was a need for the research to facilitate a more complete understanding of the factors contributing to software acceptance.

User acceptance is often the pivotal factor determining the success or failure of software development projects. TAM is used to address why users accept or reject software and how user acceptance is influenced by system characteristics across users perceptions and their attitudes toward the software. Although the two constructs were developed to evaluate software prototypes, the premise where the result of the evaluation is based on the user's acceptance or rejection of software in natural settings was found to be very suitable for evaluating the CI software recommended for the SME clusters. Therefore, the two constructs, perceived usefulness and perceived ease-of-use, as developed by Davis were integrated into the research methodology. The following paragraphs further define the two constructs.

Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his/her job performance"240. The importance of perceived usefulness as an important determinant of user acceptance derives from the TAM model, which proposes that perceived usefulness affects IT usage due to the reinforcement value of outcomes. Davis reported that user acceptance of an IT system is driven to a large extent by perceived usefulness. He also argues that perceived usefulness is the most influential determinant of software usage underscoring the importance of incorporating the appropriate functional capabilites in new systems. Further, positive association between perceived usefulness and software usage has been reported by several other studies241242243.

Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of physical and mental efforts"244. Davis et al. found that ease of use is an important determinant of system usage operating through perceived usefulness. He also states that

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240 Ibid.
the effective functionality of a system, that is, perceived usefulness, depends on its usability, i.e., perceived ease of use. Davis later suggests that perceived ease of use may actually be a prime causal antecedent of perceived usefulness\(^{245}\). TAM also postulates that perceived ease of use is an important determinant of attitude toward using software.

Davis’ TAM model was selected above other models, to be applied in the final phase of this research, because it is parallel to the respective objectives of the research, that is to achieve the prospective users’ perceived effectiveness of the CI software that were evaluated in this research project.

### 4.5 Conclusion

The third literature review chapter further narrows down the research topic into aspects related to Stage Two of the research. The purpose of this chapter was to investigate the issues on CI technology generally accessible to SMEs. This chapter also explored current CI software applications, as well as the chronology of previous evaluation studies of CI software. The literature study on CI software evaluation prepared the researcher by identifying the main weaknesses of past methods and creating provisions for an improved method that can achieve greater value in the interest of Malaysian ICT SMEs. An overview on approaches to evaluate the perception of effectiveness and Davis’ TAM were discussed to include a way to obtain verification of the research’s outcomes. A higher level of awareness pertaining to these issues and methodologies allowed for a more informed and efficient methodology.

Chapter 2, Chapter 3 and Chapter 4 of the thesis explored CI-related concepts and theories, background on Malaysian SMEs in the ICT sector in relation to CI, and provisions to evaluate study of CI software for small and medium-sized business environments. The overall research strategy and the methodologies utilised in the two empirical stages of this research project have been formulated on the basis of the knowledge which concepts and theories provided on the CI software and the SMEs under investigation and are discussed in the following chapter.

Chapter 5
Methodology

5.1 Introduction

The Intelligence Cycle, as mentioned earlier, informed the overall research strategy of the project consisting of two significant stages, which sought to investigate competitive intelligence software for use in small and medium-sized enterprises in Malaysia. This chapter discusses the nature of the two research stages and outlines the research strategy that links them together. Furthermore, data collection, evaluation and analysis processes, in each stage, are described and issues of reliability of data and validity of measures are addressed.

To achieve the first of aim of the research, the first empirical stage sought to identify the structures and contexts of MSC-status SMEs in Malaysia, and their intelligence needs towards the structuring of the ‘taxonomy of competitive intelligence configurations for MSC-status SMEs of Malaysia. In achieving the research’s second aim, stage two sought to identify and evaluate CI software packages, based on the configurations established by the taxonomy structured in stage one. This stage also addressed the perceived effectiveness of the CI software tools, as well as differential evaluations and levels of perceived within the participating companies.

Given that little work has been undertaken in the evaluation of CI software for use in SMEs, and none is known in the context of Malaysia, the research which forms the focus of this thesis may be characterised as exploratory, which implies the addressing of the research’s aims and objectives as well as the more formal process of hypothesis testing.

5.2 The Methodological Framework

Figure 4.1 shown below represents the methodological framework for the research, combining several theories and concepts. To achieve the Taxonomy of CI Configurations for SMEs, Mintzberg’s Analysis for Organisational Configurations, Bouthillier and Shearer’s Intelligence Cycle, and Herring’s Key Intelligence Topics were employed. The Taxonomy was then used as a basis for the construction of evaluation criteria and simulations for evaluating CI software. Finally, to test the Taxonomy and the validity of the software evaluation, Davis’ Technology
Acceptance Model (TAM) Model was used to evaluate perceived effectiveness. These models are explained further in the literature review chapters and in the following chapters.

![Diagram of the Methodological Framework]

**Figure 5.1 The Methodological Framework**

The collected concepts and models combined to create this methodological framework guided the research in:

- *The collection and development of research tools and methods employed.* It assisted in the choice of tools and methodologies by providing criteria to be satisfied by them, rather than employing unproven assumptions.

- *The fulfilment of the aims and objectives of the research.* All data gathered and software evaluation frameworks analysed were interpreted based this methodological framework.

It is to note that some extensions and modifications to the concepts to suit the context of the research were made in executing the research strategy.

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5.3 Research Strategy

The first research stage investigated structural and contextual features, and the intelligence needs of SMEs. This was undertaken via a questionnaire survey of a range of SMEs that was given the MSC-status by the Multimedia Development Corporation (MDC) in Malaysia, and interviews with key informants from selected companies in the sample, in order to provide a taxonomy of these organisations. The questionnaire was chosen as the most appropriate tool for gathering structured, more objective data, covering company background, structural characteristics, hardware compatibility and requirements and software and functional needs from the perspective of the Intelligence Cycle. The questionnaire of this nature allowed for quantitative analysis in producing its findings. To complete the configurations, the interview approach was chosen as the most appropriate tool to gather data that were more subjective in nature, covering strategic decisions, descriptions of early warning and profiles of key stakeholders in the competitive environments. Observations were noted during interviews to support assumptions when needed.

The building of a taxonomy of SMEs in terms of their intelligence needs formed an important component of analysis and evaluation, and the research aimed to delineate subgroups within a general category. The identified subgroups reflect the industry clusters within the precincts of the Multimedia Super Corridor:

a) software developers/business applications service providers,
b) production (postproduction/animation/graphic design),
c) telecommunications,
d) content development,
e) education and training,
f) hardware/electronics design,
g) systems security,
h) systems integration,
i) mobile/wireless technology, and
j) shared services.

The questionnaire employed in this stage used predominantly closed questions and its construction is more fully discussed in chapter 5. The elements of structure and context, and the stages of the Intelligence Cycle operationalised in the questionnaire were initially identified by a review of relevant business, organisational and competitive intelligence literature, and results were subjected to cluster analysis (see chapter 5 for further details concerning the process of
The questionnaire drew on respondents’ views on structure and context of the respective companies, followed by views on aspects within each stage of the Intelligence Cycle.

The interview part of the first phase augmented the structural analysis and views of the Intelligence Cycle by employing open-ended questions in a semi-structured interview situation. The interviews were focused on the respondents’ explanations of key intelligence topics (KIT), divided into three parts: a) business decisions and strategic topics, b) early warning topics, and c) key players. The first part of the interview, business decisions and strategic topics, identified the decisions and/or strategic directions the company might take and/or have taken, while considering the types of competitive information, as well the methods and timing in using it. The second part of the interview, early warning topics, discussed the company’s recent unexpected events and its effects, and ways of anticipating the events using competitive information. The third part of the interview, key players’ topics, explored highlighted key players within the company’s competitive environment, and the aspects of these players thought to be important to the company. The interview part of the first stage developed a respondent-centred explanation of key intelligence topics, as interviews were conducted with CEOs, or their equivalent, from each cluster. The results from the questionnaire survey structured the taxonomy, and informed the software evaluation framework in the second stage of the research. The information gathered from the interview was integrated into the taxonomy, adding the key intelligence needs aspect of the structural and contextual configurations. The information from the interview was also used to customise the software evaluation framework to help simulate the individual company/cluster approaches to using the selected software.

The second stage of the research utilised the intelligence configurations taxonomy developed in the first stage in resuming the evaluation of a range of competitive intelligence software selected for use in small and medium-sized business environments. The details about the SME sample and software selection are explained further in Chapter 6. The software evaluation framework focused on the software’s functionalities placed against the six stages of the Intelligence Cycle. Generally, the first part of the evaluation identified the functions in the software that supports the first stage of the Intelligence Cycle, the identification of CI needs. The second part of the evaluation assessed the elements within the software functions that collect competitive information. The third part identified and evaluated the software features that organise, store and retrieve competitive information. The fourth part explored aspects of the software that assist in the analysis of competitive information. The functions of the software that help develop CI reports
were then investigated in the fifth part of the evaluation framework. The sixth part, as it is in the last stage of the Intelligence Cycle, evaluated the functions of the software that assist in the dissemination of CI reports. The last part of the evaluation framework examined the requirements of the software, in terms of technology requirements, as well as its costs and benefits. It was recognised that part of the research represented only one view on the uses and functions of the software.

In part to redress this imbalance, to evaluate the potential divergence of perception of software effectiveness, which might exist within and among the SMEs, and to explore the effectiveness levels achieved by SME types from the derived taxonomy, a multiple constituency approach was employed to conclude the research. The constituencies identified within the SMEs are described in detail in Chapter 6. The constituencies were designed to reflect levels in the company structure, job scope differences, and industry cluster.

To achieve a systematic feedback about the recommended software, the selection of applications was presented before the respondents, which comprised of groups representing their respective clusters per software. The respondents were then asked to take the concluding survey. Here, the research instrument employed was a set of questionnaires with closed questions. These questionnaires incorporated the dimensions of software effectiveness, and qualitative analyses were undertaken to establish whether respondent's evaluation of the software presented could be differentiated along the effectiveness model. Issues of methodology for each of the two stages including: a) sample selection, b) construction of research instruments, c) operationalisation of concepts, and d) validity of constructs and reliability of data, are dealt with in detail in the two constituent chapters which follow. However, some general points of principle need to be addressed before a detailed account of method can be given.

Descriptive developmental research was undertaken in the first stage of the project as a snapshot of structure, context, and key intelligence needs of SMEs. Quantitative as well as qualitative methods were utilised as parts of the overall research strategy and multidimensional measurements of structure, context, key intelligence needs, software evaluation, and concepts and perceptions of effectiveness were employed. Correlations were also explored for a number of variables to enable an investigation of the interrelationships among them. The methods employed included utilisation of questionnaires and semi-structured interview items lists. Further discussion of the research analysis strategies, methods, tools and ways of presentation of the data is reported.
in the following sections of this chapter, which describe the processes involved in the two-stage research project in detail.

5.3.1 Use of Secondary Sources

Analyses of secondary sources were also undertaken at various stages in order to inform the researcher about the policies and government initiatives, and scope and *modus operandi* of SMEs. In gathering information related to the structure, context, and financial situation of the SMEs, the Multimedia Development Corporation, headquarters of the Multimedia Super Corridor in Cyberjaya, was contacted at the earlier part of the project. Permission to view their company documents, including copies of business plans, background reports, annual reports, policy-related documents, forward plans and financial summaries, was sought and where granted, a review of the material took place centrally at MDC, where these files were kept. This reading gave access to an account of the SMEs' activities as documented in the various above-mentioned forms.

Administrative records of this kind were collections of documents containing mainly 'factual' information compiled in a variety of ways and used by MDC to record the development and implementation of activities that are central to their functions. Documents were subjected to an analytical reading and provided information, which was indicative of the scope of the SMEs. In reviewing secondary source materials, the researcher exercised caution as the accuracy of the material is sometimes subject to question\(^247\) \(^248\). In particular, documentation in some instances was incomplete and different methods of measurement and/or translation of incidents may have been used in the various cases reviewed. To avoid bias interpretations and other problems relating to data gathering from secondary sources, the researcher was made aware of areas to take caution, including definitions, accuracy of measurements, reliability of statistics, source bias, and time scale (the researcher reported only on data from sources no more than ten years old).

5.3.2 Stage 1 To develop a Taxonomy of Competitive Intelligence Configurations for SMEs

Online questionnaires were used in part of the first empirical research stage as a form of survey. The aim was to design a questionnaire, which would a) gather data on significant structural and


contextual variables, as well as the Intelligence Cycle stages, which are included as variables, and b) be easily understood by respondents. The questionnaire (in Appendix 1, A1.1) was introduced to respondents in a way that highlighted the fact that it was dealing with a topic of relevance to the respondent, and which was recognisable as important and worthy of the time it took to complete so that a greater response rate was secured. It is further noted that face-to-face, telephone, and mail surveys produce similar responses to the same questions. Since the online questionnaires were sent to the e-mail addresses of management level executives that were listed in the database provided by MDC, the respondents were assumed to be on the management side of the SMEs. For many commentators, the most fundamental drawback of online, self-administered questionnaires is that they can generate low response rates. However, a 39.7 per cent (270 respondents out of a total population of 680) response rate was reached during the first stage, which, according to a table by Sekaran that listed sample sizes calculated to be representative to population size, is an acceptable level for an analysis of this type. The response rate referred here was the total number of respondents that had stated their designation to be management level posts, which further verified the validity of the sample.

The approach adopted in editing questionnaire data from the first stage incorporated the tasks identified by Bryman and Cohen and Manion. The questionnaire is designed to obtain completeness, accuracy, and uniformity of understanding, and these qualities were assessed by conducting a pilot survey, questioning respondents as to their rationale for completing the questionnaire in the way they did. It is to note that the pilot study aimed to address problems relating to the content and language of the questionnaire and was not conducted to produce results that are representative to the SME population. During the pilot study, the questionnaire distributed by hand to 64 management and executives at SMEs 2004: The 5th International Strategic Partnership and Business Networking Trade Fair for SMEs, which is a five-day exhibition and presentations event held in Kuala Lumpur. Out of the 64 requests to participate in the pilot survey, 33 completed and returned the questionnaire. In-depth discussions were

250 Kahle, L., S. Beatty, and P. Homer. Alternative measurement approaches to consumer values: the list of values (LOV) and values and life style (VALS). Journal of Consumer Research 13, pp. 405-409, 1986.
subsequently held with the respondents, and in consequence, improvements were made based on their feedback.

Data reduction through coding of responses was employed for the questionnaire analyses. The statistical analysis of the data generated involved two principal stages. The first is a review of the strength and direction of the relationship between the variables employed in the study (discussed in more detail in Chapter 5). The second involved conducting cluster analysis on the data to establish whether homogeneous group of cases could be identified and in doing so establish a taxonomy of SMEs. Both analyses were conducted using the Statistical Package for Social Science (SPSS, v. 11, Mac edition). The method employed for the cluster analysis is Ward’s method of hierarchical agglomerative clustering with squared Euclidean measures. The variables employed in the analysis were converted to z-scores, since different scales had been used in the generating of raw scores. The number of clusters employed was decided by inspection of squared error via a dendogram produced by SPSS. It was first anticipated that the SMEs would be clustered either by industry, by size, or by structure. Consequently, the analysis conducted uncovered 10 cluster groups with common structural and contextual trends: Software developers, Production and design, Telecommunications, Content developers, Education and training, Hardware/Electronics design, Systems security, Systems integration, Mobile and wireless technologies and Shared services. A copy of the parameter file for the statistical analysis and a set of results indicative of the tests, are given in Appendix 1 (A1.2, A1.3, A1.4).

As foreseen earlier in the research about the data gathered from the closed ended questionnaire is that it provided a structural and contextual snapshot of SMEs (mentioned in Chapter 1, p.9), as well as their input on the six phases of the Intelligence Cycle. The questionnaire results, therefore, still lacked the capacity to structure an evaluation framework for evaluating CI software, as well as transitions towards other conditions in the research, as they did not simulate the use of the software tool based on the intelligence needs of the SMEs.

Further data collection was carried out through interviews with 12 CEOs and/or their equivalent representing SMEs from every industry cluster. These 12 CEOs or equivalent were gathered to form a focus group to represent the MSC-status SMEs. The interviews lasted between 60 and 120 minutes, and generated data relating to CEO’s perception of the intelligence needs of the companies within their cluster. The fact that responses reflected respondents’ perceptions, and data was not collected by the researcher through direct observation of the phenomena within the
company itself, must be recognised as a characteristic feature of the data. Nevertheless, the interview asked the respondents to point out examples of experiences in the company to support their perceptions of the company’s intelligence needs. Also, as the researcher had to elicit common information from all the respondents, a semi-structured interview was necessary. When probing attitudes, and/or situations where diverse opinions were prevalent, a more unstructured approach is preferable\(^{256}\). It is to note that the responses from the interviews were views and perceptions of intelligence needs, and were not conducted to represent the entire population of MSC-status SMEs due to constraints of time and resources.

The first step in constructing the interview questions was to specify the variables within the Key Intelligence Topics concept. The Key Intelligence Topics interview had been used on many occasions by practitioners in the competitive intelligence field since its development by Jan Herring in 1988\(^ {257}\). KIT is used to discover the intelligence needs of the company towards developing a CI programme and/or in evaluating a tool for use in the monitoring of competitors and/or in finding the most appropriate methods in the analyses of competitive information. However, since the interview was a semi-structured one, it was important to give some thought to the question format, as well as response mode, even though there have been a few examples of past KIT interviews. Generally, and as mentioned earlier, the interview was divided into three parts: business decisions and strategic topics, early warning topics, and key players. Additionally, the choice of question format, for instance, depended on a consideration of one or more of the following: whether the interviewer was dealing with facts or opinions; whether specificity or depth was sought; the nature of the subject matter; and the context it was placed in. Having given prior thought to those matters, the researcher was put in a position to decide whether to use open and/or closed questions, direct or indirect, specific and non-specific. Data analysis then had to be considered alongside the choice of response mode so that the interviewer could be confident that the data would serve the purposes and analysis of them could be duly prepared. Once the variables to be measured or studied had been identified, questions were constructed so as to reflect them. All interviews were digitally recorded after permission was granted from the interviewees. The recordings were subsequently transcribed and analysed in an attempt to draw cognitive maps of the key respondents’ perceptions of their companies’ key intelligence needs. Selections from the detailed transcribed interviews are included at Appendix 1 (A1.6).


\(^{257}\) Herring, J. “Key Intelligence Topics: A Process to Identify and Define Key Intelligence Needs.” \textit{Competitive Intelligence Review}, 10(2), 1999, pp. 4-14.
When the interviewer visited the companies to carry out interviews, collection of further data was possible through observation and/or by requesting company documents. During the interview, the respondents was not free to choose what was to be discussed, nor carry a topic through to completion, the interviewer directed the discussion. However, a conscious attempt was made by the interviewer to ensure that important emerging issues were not excluded even if they did not form a part of the questions list. Thus, the range of issues explored at interviews was only partially prescribed by the researcher.

The analysis of the interviews started with the identification of key intelligence needs in each industry cluster and continued with an examination of the effect(s) of the intelligence needs within each structural and contextual feature of each industry cluster. Data from SMEs belonging to the same structural and industry cluster are collated in charts to assist the researcher in identifying the main trends as regards key intelligence needs that are prominent in each of the industry clusters, and also enable comparison on the intelligence needs among clusters. Nevertheless, given the number of interviews undertaken per cluster, findings in relation to individual clusters had to be treated with considerable caution since it was impossible to determine how typical of the cluster the company response. As stated earlier, the interviews were conducted based on perceptions from the perspective of a focus group, which consisted of one to two respondents representing each cluster, covering 10 identified clusters (totalling to 12 CEOs, managers and/or equivalent).

Overall, data related to perceptions of key intelligence needs in SMEs were analysed to fit between structural and contextual characteristics, and aspects of the Intelligence Cycle in forming the taxonomy of intelligence configurations.

5.3.3 Stage 2 To Evaluate and Test the CI Software and Online Tools for SMEs

After reviewing a substantial number of vendors and software products, a general observation can be made, that the market has been saturated with software solutions and vendors that promote themselves as Business Intelligence (BI) and CI tools, but do not integrate any CI concept to their software design. Some observations, for instance, were that most Business Intelligence software, as the industry labels many of its products, typically deals with data warehouses and quantitative analysis, almost exclusively of a company's internal data (such as, CRM, customer relationship
management data). As discussed earlier, the CI process depends heavily on the collection and analysis of qualitative information that includes both internally generated and externally available data; therefore, most of the self-described CI software tools were eliminated in the early part of the selection process for CI software to include in the evaluation study. Additionally, the software tools were chosen based on characteristics about SMEs gathered from literature. Based on the preliminary observations, these aspects are comprised of limitations that are common among SMEs, such as: a) low monetary allocation for supporting technology, b) lack of expertise in competitive research c) low allocation for further training d) language barrier e) low perceived usefulness of in-house competitive research, f) stage of business development (seed or expansion), and g) lack of interest in software product differentiation. The review of the software based on these characteristics was discussed and evaluated through e-mail communications with vendors, interview with agents of the product, and analysis of the software’s demo versions respectively, as well as reviewing training downloads from vendor websites, with regard to Bouthillier and Shearer’s six-step intelligence cycle. With these considerations, a total of eight software applications were selected for evaluation, and most of the software applications evaluated were ones that have not been considered in previous CI software evaluations, which contributed to the uniqueness of the research.

The overall construction of the software evaluation framework was based on the taxonomy developed in stage one (illustrated in Table 6.6 and discussed in detail in Chapter 6), which informed the evaluation of the SME’s key intelligence needs in relation to its categorised structures and contexts, as well as values placed within the stages of the Intelligence Cycle. However, there were two parts in the evaluation process: the preliminary evaluation, which gave a comprehensive look at the software’s functionality, and the second evaluation according to cluster, which evaluated in accordance to the contexts and needs of each cluster derived from the taxonomy. In the preliminary evaluation, the variables used were from the six phases of the Intelligence Cycle. Reflective of the iterative process, the evaluation structure began with testing the software’s functions that assisted in identifying and managing key intelligence topics, such as the software’s ability to gather a team’s input towards an objective of a certain project, which suggested a function that enabled collaboration and/or aspects of project management. Secondly, the researcher evaluated the functions that help acquire the information needed, such as search engines, meta-search engines and/or portal technologies that have or can be integrated within the

software, as well as functions that enable the monitoring, filtering, alerting, and rating of competitive information. Thirdly, the evaluation tested the organisation, storage, and retrieval functions of the software, involving the indexing functions, relevance ranking and validation, dynamic summarisation functions, automatic categorisation, storage capacity, abilities to handle a variation of formats and to link related information between the documents. Fourthly, the researcher evaluated the part of the software that assisted in the analysis of competitive information, for example, whether the software was able to organise data or information into various analytical templates. The fifth part of the evaluation concerned the software's capabilities in the development of CI reports, which involved the testing of design functions, customisability, and sophistication of outputs. The sixth and final part of the preliminary evaluation rated the dissemination function of the software, which includes modes of delivery and security functions to accessing of CI reports. A more comprehensive overview of software attributes is further discussed in Chapter 7 of the dissertation.

The first part of the evaluation process discussed above explored the functionality of the software but did not determine efficiency of the applications in the different environments within each industry cluster and structure. Therefore, the second part of the evaluation process tested the software based on the contextual characteristics and key intelligence needs for each industry cluster, as well as the Intelligence Cycle variables that match the results revealed in the taxonomy (illustrated in Figures 7.1 to 7.10 of Chapter 7). In other words, the evaluation framework for this part of the process was customised to the needs of the companies within each of the 10 industry clusters (listed in section 5.3, second paragraph); hence, there were 10 different evaluation outlines, one for each cluster, to simulate each environment type to a degree (see Appendix 2, A2.1 – A2.10). A detailed report on the findings is further discussed in Chapter 7 of the thesis.

The analysis of the evaluation continued with the examination of the software in altering contextual characteristics. The results and conclusions made about each software were then set against the contexts and characteristics outlined in the taxonomy to provide a comparison so that the right software suitable for companies within their respective clusters may be identified. The functions and characteristics of the software that provided the closest match was assigned to the industry cluster as a recommendation for relevant SMEs. It had been expected that one or more software product would be recommended for companies within their industry cluster based on their respective needs.
Data gathered from stage one, followed by the evaluation of software in stage two, were based on the perception of one type of insider account, the CEO or its equivalent, and therefore claims of reporting the plurality of views from employees of different levels and job scopes were not made. For that reason, the second stage of the research concludes with a feedback study to evaluate the perceptions of effectiveness in using the CI software amongst employees of different levels within selected companies. Details of the findings are in the latter part of Chapter 7 (section 7.5).

In this part of the research, respondents were drawn from 10 companies, one company representing each industry cluster, in order to conduct a survey on their perceptions of effectiveness of the recommended software. These companies were selected from among those which took part in the first stage of the research project. The selection of particular companies was influenced to a small degree by pragmatic concerns of willingness to participate, geographical proximity, and accessibility, only because the participation inquiries were first given to willing participants within the researcher's vicinity without any vested biasness of outcome. The different constituencies within the SMEs were conceptualised by grouping respondents by level of seniority (senior, middle management, and lower level employees). In addition to the three constituencies, the perceptions of liaising officers in MDC's Technopreneur Division, who were moderating officers of SMEs with MSC-status, were investigated.

Before the survey took place, the researcher visited the 10 companies to carry out 8 demonstrations of the software recommended to the respective industry cluster. The software demonstration was conducted only on the software that was recommended for each company representing an industry cluster. The construction of the demonstrations aimed to give an adequate overview of its use and functions so as to give sufficient information for the respondents to make decisions towards its effectiveness within the company's respective environments. For the most part, the researcher had used the software itself in the demonstration; other demonstrations used presentation tools, explained through saved images of the software interfaces, for it was not possible for three of the eight applications to be implemented due to technology and security constraints. The demonstrations lasted between 45 and 90 minutes, depending on the comprehensiveness of the software in demonstration.

The selection of staff from senior and middle management, and lower level employees surveyed was undertaken in consultation with the Chief Executive Officer's (or equivalent) evaluation of the role of the respondent based on criteria provided, relating to the roles of senior management,
middle managers, and line staff. However, since some SMEs can be very small in size, there were expectations that the companies in study would lack personnel at some levels, particularly middle management levels. Questionnaires were given to the selected respondents in person by the researcher immediately after the presentation concluded (This questionnaire is reproduced in full in Appendix 2, A2.11).

The analysis of the data started with a set of hypotheses related to the effects of: a) levels of staff, i.e. senior management, middle management and lower level employees, and moderating officers at the MSC headquarters (MDC), and b) industry cluster membership, on perceptions on what constituted software effectiveness, and of how effective the software can be within the respondent's working environment. The analysis performed and its findings (summarised in Tables 7.4a and 7.4b) are discussed further in detail in the second half of Chapter 7.

5.4 Reliability of Data

Reliability of data stems from the appropriateness and consistency of the measures used. This notion can be taken to comprise two elements: external and internal reliability. Externally reliability refers to the degree to which a measure is consistent over time. The most obvious way of establishing reliability is to administer a measure on two different occasions and to examine the degree to which respondent's scores are consistent between the two time periods (test/retest reliability). However, indications of low levels of stability over time may at least in part be attributable to intervening events and/or changes to the respondent. If the span of time between the tests is reduced to minimise such effects, it is not inconceivable that the proximity of the tests and retests will engender a spurious consistency, since people may recollect their initial responses. A repetition of the two-stage research survey and evaluation undertaken in this study, which incorporated questionnaires and interviews, was perceived to be neither absolutely necessary nor possible within the research time available. It was felt that the researcher should focus on the reliability of the research tools and their strength in measuring the various concepts.

Internal reliability refers to the degree of internal consistency of a measure. This issue was of particular importance in the context of multiple item measures used in the first stage since the question had to be addressed as to whether the constituent indicators cohered to form a series of single dimensions. One widely employed method of establishing reliability in this sense, which uses a great deal of information about the item in question and their correlations, was through
calculating Cronbach's alpha score as a measure of internal consistency\textsuperscript{259, 260, 261, 262}. In essence, this method computed the average of all possible split-half correlation coefficients. The Cronbach Alpha score was measured for each composite measure used in stage 1 and where internal consistency was low, the variables were either disaggregated or excluded (the scores' interpretations are discussed in Chapter 6 (Section 6.2.3).

Data from interviews in stage 1 and the questionnaires in stage 2 were qualitative in nature and statistical internal reliability tests were not employed. Samples of the coding undertaken by the researcher, however, were double checked by a third party with expertise in research, namely Claire Creaser, senior statistician and Director of LISU, a research centre based in Loughborough University and Professor Anne Morris, whose background include statistics and mathematics and also the researcher's Director of Research, so as to avoid: a) mistakes in the way in which data was collated in charts and reported, and b) situations whereby the original transcribed conversations might have been misinterpreted and have therefore been different from what the researcher thought was actually said.

5.5 Validity of Measures

The process of validation of the research strategy, of measures, and of variables employed, has two dimensions; internal and external. The former addresses the question of whether the research strategy has controlled for the influence of extraneous variables that could serve as alternative explanations of why the results of the study turned out the way they did. This underlines the necessity, which is advocated by Bedeian\textsuperscript{263}, of making certain that the influence of all variables that might account for observed changes are taken into consideration both in the design of the study and in the interpretation of its findings. If, when compared to the reported findings, there were no equally likely interpretations of the study's results, the study was said to possess internal validity.

The question of internal validity of the measures raises the issue of whether measures are really related to the concept that they are claimed to operationalise. One basic way of establishing this aspect of internal validity was to gauge whether a measure had ‘face validity’. Quite simply, this meant that it was necessary to examine whether for expert opinion there appeared to be a correspondence between the measure, be it a single indicator or a multiple-indicator index, and the concept in question. This approach to establishing validity was highly judgemental, the main problems associated with it being even greater when the meaning of the concept itself was controversial and complex (e.g. perceived effectiveness). The senior officer in Multimedia Development Corporation (MDC) in Malaysia, Dr. Cheah Leong Wan, who was responsible for the liaison with SMEs was contacted at the early stages of the research and provided comments and suggestions in relation to the validity of operationalised measures. Holding a PhD himself, he had direct contact with all SMEs in the ICT sector as he was involved in forward planning and reviewed their performance at the business assessment panel meetings at MDC. Before research tools were sent out to the pilot study companies, he commented on the questionnaires of stage one and two and the interview questions lists in stage one, and his observations, along with input from the Supervisor and the Director of Research considered, informed the final construction of the research instruments employed. After amendments, all research instruments were piloted before being sent out or presented to the whole sample of SMEs. In particular, the questionnaires used in the first and second research stages were piloted to 33 (out of total 64 managers and executives) and five companies (out of 64 companies), respectively. Note that the pilot was initiated to gain feedback regarding the appropriateness of the questions, specifically the difficulty level of the language (English) used (since the survey was done in Malaysia) and consequently determine whether to have a Malay version, which in this case, was not required. Feedback from the companies was also used to strengthen the validity of the research tools by avoiding ambiguous questions. In addition to the MDC official, input from senior statistician, Claire Creaser, who also assisted in the research’s reliability study mentioned in the previous section, on data analyses was also considered. She had verified that the statistical approach taken in the analyses to be the most feasible option. She also provided input towards the finalisation of the evaluation criteria for software evaluation study in stage two of the research.

Internal validity of variable was also addressed. This procedure linked validation with a theoretical arena, since variables were included and excluded on the basis of their connection with theory (e.g. Bouthillier and Shearer’s Intelligence Cycle, Herring’s Key Intelligence Topics
and Mintzberg's Organisational Theory) and their inclusion in relevant research projects (e.g. Herring, 1999\textsuperscript{264}, Francis \textit{et al}., 1999\textsuperscript{265}, and Davis, 1989\textsuperscript{266}).

External validity of the research project concerned the representativeness or generalisability of the results and addresses the extent to which the study's findings was generalised (that is, be applied to, or across, persons, setting, and times not represented in its sample). The SMEs studied in this research represent a sample drawn from the population of MSC-status SMEs in Malaysia. External validity of measures and variables concerns the applicability of these to the range of SMEs. Given that SMEs, like most SMEs in any one sector, differ extensively in terms of business approaches, structural and contextual characteristics, the operationalised variables and measures used, had to apply to all types. In this instance, again, the senior liaising officer in MDC, as well as the statistician from LISU, assessed the applicability of the tools in operationalising the variables and measuring the concepts in the research.

5.6 Conclusion

The theoretical approach of this bipartite research project was founded on the realisation that the ability to analyse various aspects of companies and software depended on the adequacy of the theoretical schemes employed. Such theoretical schemes not only guided the search for significant relationships among the seemingly limitless 'facts' that exist in the settings of SMEs as well as in the functional environments of the CI software and related technologies, but also assisted in establishing the difference in the researcher's eyes, between knowing the theories and concepts, and understanding its meaning. As a consequence, the research efforts were aided by a substantive body of theory and concept discussed in detail in chapters 2, 3 and 4. Bedeian claims that theory serves both as a tool and a goal. The tool function being evident in the proposition that theories guide research by generating new predictions not otherwise likely to occur. As a goal, theory is often an end in itself, providing an economical and efficient means of abstracting, codifying, summarising, integrating, and storing information\textsuperscript{267}.

\textsuperscript{264} Herring, J. "Key Intelligence Topics: A Process to Identify and Define Key Intelligence Needs." \textit{Competitive Intelligence Review}, 10(2), 1999, pp. 4-14.
The first stage sought to identify the structural and environmental characteristics of SMEs in the ICT sector in Malaysia, and their intelligence needs, and to develop a taxonomy of “intelligence configurations” for SMEs. Following a review of the methodological considerations for the first stage of the research, it is important to note that Aim 1 was undertaken to produce various configurations of SMEs, which provide a better understanding of structural, contextual, process and dynamics, from the perspective of CI theory, found in SMEs. The second stage involved the identification and evaluation of CI software packages accessible to SMEs within the configurations of the developed taxonomy. This stage also addressed the perceived effectiveness of the selected CI software tools, and differential evaluations of effectiveness (levels of effectiveness) among different users or levels of users within the companies. After a review of the methodological considerations for the second stage of the research, is also important to note that the study was to produce findings relating to the suitability of the software’s functions to the criteria and needs extracted from the taxonomy, as well as validate the usability of taxonomy developed in Stage 1 of the research.

The following chapters 6 and 7 respectively, report the two empirical research stages, their sample selection, methodology, operationalisation of concepts, findings and conclusions, in detail.
Chapter 6
Taxonomy of Competitive Intelligence Software Configurations for MSC-status SMEs in Malaysia

6.1 Introduction

The nature of this stage of the study was influenced by Ben Gilad’s perspectives on Henry Mintzberg’s classic analysis of organisational configurations and aimed to identify the nature of the structural and contextual configurations which exist within the MSC-status SMEs of Malaysia, its relations to Key Intelligence Topics and the Intelligence Cycle. Although resources did not allow the structures and contexts of the companies and their changes over time to be evaluated, it was important to identify what structures exist and in what contexts within the SMEs. The analysis developed draws on the results of a questionnaire survey and interview conducted to establish the significant structural and contextual features of Malaysian SMEs, and provides a taxonomy of these companies. Taxonomies, as Hammersley and Atkinson argue, can become helpful in the identification of differences in the data and can assist in the evaluation of relationships between the structural, contextual, KIT, and the Intelligence Cycle variables.

The first part of this chapter reports the analysis involved in identifying homogeneous groups of SMEs employing cluster analysis of structural and contextual characteristics, and the significance of the phases in the intelligence cycle.

The second part of this chapter contains analysis of in-depth interviews of Chief Executive Officers (or their equivalent) from a range of SMEs drawn from the ten company clusters identified. The interview stage of the project progresses beyond the cluster analysis of the companies by clarifying the three aspects of the key intelligence needs: business decisions and strategic topics, early warning topics, and key players.

Following the identification of significant correlation between variables employed and the assessment of respondents’ explanations of key intelligence needs, this chapter incorporates a discussion of the implications of these relationships. On the basis of the cluster analysis
conducted and supporting information gathered from the interviews, a taxonomy of intelligence configurations for SMEs was constructed, consisting of ten clusters.

The following two sections discuss the analysis and findings. The first section discusses the analysis of data gathered from the questionnaire. The second section discusses the findings gathered from the interview. This chapter concludes with a discussion on the overall outcome of the survey and the development the taxonomy of CI configurations.

6.2 Questionnaire Data Analysis

This section discusses the analysis of the data gathered from the questionnaire survey.

6.2.1 Questions Informing the Analysis

The questions informing the analysis were based on the objectives of Aim 1 discussed in Chapter 1. Generally, it can be assumed that the SMEs in Malaysia, on which this study is based, have faced a number of important changes to the context in which they operate. First, there is an increase in activity and government support for Malaysian SMEs in the ICT industry to be more competitive, locally as well as internationally. Thus there was a need to identify structural and contextual characteristics to form a basic structure of the taxonomy model. This leads to the question ‘What are the structural and contextual characteristics of Malaysian SMEs in the ICT sector?’ Secondly, the changes in competitive activities amongst SMEs lead to increasing concerns on developments in strategic performance, platforms for technological tools and infrastructure, as well as factors relating to targeted competitors. In addition to these functions, these categorisations help in identifying different types of needs in terms of the preparations of competitive intelligence operations within these SMEs, which brings the researcher to the question, ‘What are the key intelligence needs in terms of strategic actions, technology planning and decisions, and specific competitors?’ Thirdly, there has been a stimulus for Malaysian SMEs to move towards public sector support for increased access to international markets. Support of the MSC, which includes exclusive access to the centralised state-of-the-art IT infrastructure, and business consulting, provides ready market access through government supported missions and related activities. This leads to the third question, ‘How does availability of resources play a role in the structure, context, and intelligence needs of SMEs?’ Fourthly, with access to information being one of the main incentives, there is a need to identify current intelligence specific tasks of
SMEs in terms of gathering and organising competitive information, which then further raises the question of whether there are differences in the tasks between structures and contexts of these companies. Fifthly, this phase of the research was required to produce a taxonomy of configurations, which identified the relationships between each identifiable structure and context of these SMEs in terms of specific CI tasks and their intelligence needs.

6.2.2 Sample Selection and Methodology

The SMEs incorporated as subjects in this study were selected in the following manner. The Multimedia Development Corporation or the MDC (MSC Headquarters), the semi-government body that supports the development and maintenance of SMEs in the ICT sector in Malaysia, was approached to obtain permission to view related files of the companies held centrally by the MDC. After a positive reply, annual reports and accounts were reviewed, and the questionnaire was piloted to 33 respondents, handed out by hand to a total of 64 managers and executives from ICT SMEs that participated at SMEs 2004: The 5th International Strategic Partnership and Business Networking Trade Fair for SMEs, which is a five-day exhibition and presentations event held in Kuala Lumpur. In-depth discussions were then held with the respondents to improve the questionnaire further. After making the proper changes, the participating companies were also subsequently sent an invitation to visit an online version of the questionnaire, or where necessary, contacted in person, or by telephone, for invitation to visit, for further clarifications and to elicit further information.

The research instrument employed, the questionnaire, is reproduced in full in Appendix 1, A1.1. Discussed below is the rationale for the construction of the questionnaire and the composite measures derived from it. The response rate was 39.7 per cent with 270 out of a total population of 680 small and medium-sized companies under the MSC completed the questionnaire. Although the sample incorporated a wide spectrum of different sub-industries within the ICT sector, some clusters did not respond as well as others. For example, the systems security division of the MSC-status companies came to only 8 companies, which was 3 per cent of the total respondents; companies under the telecommunications and systems integration clusters only returned 18 responses, compared to 57 from the software developers, 38 from the production and design cluster, and 29 from shared services. The breakdown of number of respondents within each cluster is stated in Table 6.2.
The statistical analysis of the data generated by the survey involved two principal stages. (A copy of the parameter file for the statistical analysis is included in Appendix 1, A1.2). The first was a review of the strength and direction of the relationship between the variables employed in the study. The second involved conducting cluster analysis on the data to establish whether homogeneous group of cases could be identified and in doing so establish a taxonomy of SMEs. Both analyses were conducted using the Statistical Package for Social Science (SPSS, v. 11, Mac edition). The method employed for the cluster analysis was Ward's method of hierarchical agglomerative clustering with squared Euclidean measures, as it is the appropriate method to conduct an analysis of a sample this size (less than 300, verified by Prof. Anne Morris, Director of Research) that aim to establish and identify common groups with common characteristics. The variables employed in the analysis were converted to z-scores, since different scales had been used in the generating of raw scores. The number of clusters employed was decided by inspection of squared error produced by the SPSS 11 and visually illustrated by a dendogram included in Appendix 1, A1.3 allowing identification of the point at which inclusion of a further cluster would significantly increase squared error. The number of clusters identified was ten. They are as follows:

a) software developers/business applications service providers,
b) production (postproduction/animation/graphic design),
c) telecommunications,
d) content development,
e) education and training
f) hardware/electronics design,
g) systems security,
h) systems integration,
i) mobile/wireless technology, and
j) shared services.

Where composite measures were employed in the operationalising of concepts such as number of employees, specialisations, technological structure, resource accessibility, and research capability, Cronbach’s alpha was employed as a measure of the internal consistency of such composite measures (with the discriminatory level set at 0.7 as recommended by Allen and Yen\textsuperscript{268}). Thus measures that generated an alpha score lower than 0.7 were either disaggregated or rejected. In further verifying the validity and strength of these measures, the statistical analyses

were further advised and supported by Claire Creaser, who is a senior statistician and Director of LISU, a research centre for information services based in the Department of Information Science, Loughborough University.

6.2.3 Operationalisation of Concepts

Based on Gilad’s perceptions in the application of Mintzberg’s typology of organisations, and Bouthillier and Shearer’s Intelligence Cycle, the framework for this research employed as key structural variables those of, number of employees, specialisations, technological structure, resource accessibility, and research capability, while the key contextual variables employed were the six phases of the intelligence cycle, which are identifying CI needs, acquisition of competitive information, organisation, storage and retrieval, analysis of information, development of CI products, and distribution of CI products.

Structural Variables

(a) Number of employees
The number of employees has been treated in this study as the key measure of size as a structural variable. (Appendix 1, A1.1, Section A, Q2)

(b) Specialisation
This was assessed by the individual staff’s perceived definition of job scope and level of specialisation. (Appendix 1, A1.1, Section A, Q3)

Contextual Variables

(a) Technological structure
The complexity of the SME’s technological structure was assessed by the company’s level of access to supporting technology tools. (Appendix 1, A1.1, Section A, Q4)

(b) Resource accessibility
The focus here was specifically on financial resources. The measure of resource accessibility was operationalised by the rate of turnover the company achieved per annum. (Appendix 1, A1.1, Section A, Q5)

(c) Research capability
The research capability of the SME referred to the rate of research activities within the company on competitors and other elements of relating to the competitive environment. (Appendix 1, A1.1, Section A, Q6)
Intelligent Cycle Variables

(a) Identification of CI needs
The level of importance in having software that was capable of identifying CI needs of the SME involved the development of a measure that focused on specific questions relating to activities (i.e. questions relating to different types of competitive information) involved in this part of the intelligence cycle. The nine item score (Appendix 1, A1.1, Section B, Q1a - Q1i, Q2) gave an alpha score of 0.8.

(b) Acquisition of competitive information
The assessment of acquiring competitive information also involved the development of a measure to assess the level of importance in having software that supported the collection of CI. This 18 item score (Appendix 1, A1.1, Section C, Q1. Q2a – Q2h, Q3) gave an alpha of 0.7.

(c) Organisation, storage and retrieval
In this study, the nature of tasks of SMEs in organising, storing and retrieving competitive information was considered in the development of a measure in assessing the level of importance placed in having a software that supports this phase of the intelligence cycle. This ten item score (Appendix 1, A1.1, Section D, Q1a - Q1i, Q2) gave an alpha of 0.8.

(d) Analysis of information
The views of different aspects of CI analysis, as well as the types of analysis, were taken into account in developing the measure for this heading due to its subjective nature. The measures (referring to Questionnaire in Appendix 1, A1.1, Section E, Q1 and Q2a – Q2e) were, however, distinctively unstable and exploration of the concept was more amenable to qualitative analysis.

(e) Development of CI products
The focus in this study under this heading had been on different aspects of report making, such as design, flexibility, formats, and other details, which all were involved in developing a measure to assess the importance of a software to help develop CI reports/products for the SME. This six item score (Appendix 1, A1.1, Section F, Q1a – Q1f) gave an alpha of 0.96.

(f) Distribution of CI products
As in (e) above, the focus under the distribution of CI products has been on different aspects of dissemination, such as methods of distribution, security issues, and other details, which were involved in developing a measure to assess the importance of software to support this phase in the intelligence cycle. This six item score (Appendix 1, A1.1, Section F, Q2a – Q2g) gave an alpha of 0.93.
6.2.4 Analysis of Findings

It was anticipated that the analysis of SMEs would provide evidence of a variety of structures in relation to the CI process. This conviction was founded on two factors. First, agents within the companies might react differently to similar organisational contexts, and second, the contexts and resources vary from one company to another so that similar structural designs might be inappropriate or simply not feasible.

As indicated earlier, the statistical analysis of the data consisted of two parts. The first was an overall review of the strength and direction of the relations between the variables cited, illustrated in Table 6.1. The results shown in this table was based on an analysis of nominal data, referring to questions in Section A, Q2-Q6; Section B, Q2; Section C, Q3; Section D, Q2; Section E, Q2e; Section F, Q1F and Q2g (referring to the questionnaire in Appendix 1, A1.1). Table 6.1 is the output produced using Spearman’s rho via SPSS. The table displays some confirmation of, and some deviation from, the relationships perceived by Gilad as well as Mintzberg. The entrepreneurial SME, for example, it was anticipated, would be negatively associated with the number of employees, specialisations, and technological structure, while the ad hoc SME, it might be assumed, would be positively associated with specialisations. The SME that is both entrepreneurial and ad hoc would be expected to exhibit positive associations with specialisation, but exhibit negative associations with number of employees. As for contextual relationships, the number of employees in SMEs, it might be assumed, would be positively associated with specialisations, technological structure, resource accessibility, and research capability. Lastly, resource accessibility is assumed to have positive associations with research capability and technological structure. The reasoning underlying these anticipated relationships is as follows: The entrepreneurial SME, by definition, has relatively few staff, loose division of labour, hence, less specialisation, and little or no technostructure. On the other hand, ad hoc SMEs tend to group employees into functional units to be deployed in small project teams, hence greater specialisations. Subsequently, SMEs that are both ad hoc and entrepreneurial have few staff but these staff are usually highly specialised. The SMEs that have a larger number of employees are divided into functional units, which increase specialisations; and, have greater access to resources, hence a more complex technological structure and better research capability. Finally, SMEs with greater access to resources are likely to have better research capabilities, as well as a more complex technological structure.
Within the sample of SMEs, and in analysing the relationships between variables 1 to 5, the number of employees within the companies was significantly positively related to technological structure \((r=0.28)\) and the company's accessibility to resources \((r=0.61)\) was significantly negatively related to research capability. Specialisation was also significantly positively associated with technological structure \((r=0.16)\) and significantly negatively associated with resource accessibility \((r=-0.21)\). Technological structure was significantly positively associated with research capability \((r=0.18)\). Resource accessibility was significantly negatively related to research capability \((-0.36)\).

From these observations, some relationships might be said to be consistent with what was anticipated in the beginning of the project. For example, the correlations suggest that the SME with a larger number of employees work within a more complex or advanced technological structure, thus either allowing them to have greater access to resources or vice versa. Also, SMEs with advanced technologies were more capable of supporting proper research. As anticipated for ad hoc SMEs, companies with highly defined job scopes also had a complex technological structure. However, some relationships were less consonant with the anticipated findings. For example, it is quite logical to assume that companies with larger numbers of employees with better accessibility to resources and a highly regarded technostructure would have higher allocations and capabilities for research. Nevertheless, as the correlations indicate, it is more common within these SMEs to be less involved in research initiatives. The correlations also suggest that although a larger number of employees within a company may result in better technological implementations and resources, providing higher wages for these highly specialised teams or specialised tasks, results in less access to other resources.

As for variables 6 to 11, the samples showed that the importance placed by SMEs in the first phase in the intelligence cycle – identifying CI needs – was significantly positively associated with the second phase – acquiring competitive information \((r=0.37)\) – as well as the third phase – organisation, storage and retrieval of competitive information \((r=0.36)\) – but is significantly negatively associated with the analysis phase \((r=-0.17)\) and the distribution phase \((r=-0.32)\). The ‘acquiring competitive information’ phase was significantly positively associated with the ‘organisation, storage and retrieval’ phase \((r=0.52)\), but was significantly negatively related to the analysis phase \((r=-0.27)\), the development \((r=-0.37)\) and the distribution phases of CI products \((r=-0.39)\). To continue, the ‘organisation, storage and retrieval’ phase was significantly positively associated with the analysis phase \((r=-0.34)\) while negatively associated with the development
(r=-0.34) and the distribution (r=-0.37) phases of CI products. The analysis phase was significantly positively associated with the development (r=0.24) and the distribution (r=0.29) phases of CI products. Lastly, the 'development of CI products' phase is significantly positively related to the 'distribution of CI products' phase (r=0.71) in the intelligence cycle.

Within the sample, it can be interpreted that SMEs which regard the first phase in the intelligence cycle – identifying CI needs – to be an important function in a CI software also feel that the following two phases – acquisition of competitive information and organisation, storage and retrieval – to be important. These particular companies on the other hand, have no interest in having a software function to assist in analysing CI as well as the distribution or dissemination function. Those companies however that chose the 'organisation, storage and retrieval' function as an important utility within CI software also chose the analysis function to be important, but not the development and distribution functions of CI products. Respondents who regard the analysis phase as a vital function in CI software also feel the need to have a development and distribution function present in the software. It is also clear that companies which feel a reporting function of the 'development of CI products' phase to be important requires a disseminating or distribution function to share the CI report.

Overall, a more acceptable finding was that the SMEs with access to resources and with positive association with research capabilities were those which significantly positively associated to all phases of the intelligence cycle. Besides that, another finding was that larger SMEs (with advanced technological structures, high resource accessibility and a strong research function) have positive associations with software function that help identify CI needs, organise, store and retrieve, as well as analyse competitive information.

The presentation of the table of correlation coefficients (Table 6.1), however, may mask underlying relationships between particular sub-groups of companies. For this reason, and to derive a taxonomy of SMEs, cluster analysis was undertaken, identifying groups with homogenous characteristics. A breakdown of the key characteristics of the clusters with the respective mean and the standard deviation is provided in Table 6.2, showing the cluster scores in the variables used. All variables were standardised for the population of SMEs as a whole, such that the mean for each variable is zero, and the standard deviation 1. Thus the mean and standard deviation for each of the clusters may be compared with those of the population as a whole.
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Var1 Number of Employees  
Var2 Specialisations  
Var3 Technological Structure  
Var4 Resource Accessibility  
Var5 Research Capability  
Var6 Identification of CI Needs  
Var7 Acquisition of Competitive Information  
Var8 Organisation, Storage, and Retrieval  
Var9 Analysis of Information  
Var10 Development of CI Products  
Var11 Distribution of CI Products

* Significant at the 0.05 level  
**Significant at the 0.01 level

Table 6.1: The Correlation Coefficients and Significance Levels of Variables Employed in the Analysis of Stage 1 of the Study.
<table>
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<tr>
<th>CLUSTERS</th>
<th>Software development</th>
<th>production and design</th>
<th>telecommuns</th>
<th>Content development</th>
<th>education &amp; training</th>
<th>hardware/ electronics design</th>
<th>systems security</th>
<th>systems integration</th>
<th>mobile/ wireless technology</th>
<th>Shared Services</th>
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<td>Mean</td>
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Table 6.2: Mean and Standard Deviation of Variables (expressed as z-scores for total population).
Based on the above Table 6.2, the following paragraphs interpret the cluster analysis.

**Cluster 1 Software developers and business applications service providers**

This cluster, which had the highest number of respondents (57), most closely exhibited the structural and contextual characteristics of the entrepreneurial SME, where the majority of the sample has fewer staff and showed fairly low levels of specialisations. Also, contrary to what was expected in a sample from the ICT sector, this cluster showed fairly low levels in technological structure, which means that they lack access to technology support. As in the case of many smaller companies, their complexity level for resource accessibility was on the lower end. However, unexpectedly, low resource accessibility did not account for the fairly high complexity levels for research activities on industry and competitive environment.

This cluster showed a fairly high interest in software functions that help highlight aspects of CI needs, which relates to the first phase of the intelligence cycle; also a fairly high interest in functions to acquire and organise, store and retrieve information, which are the second and third phase respectively; a fair level of concern for analysis support capabilities, which is the fourth phase; and fair levels of importance were placed on producing and disseminating their CI findings, which are the fifth and sixth phase respectively.

**Cluster 2 Production and design (postproduction/animation/graphic design)**

Similar to the previous cluster, the production and design cluster, which had the second highest number of responses (38), also exhibited the structural and contextual characteristics of the entrepreneurial SME, which defines fairly low levels in the number of employees and also showed fairly low levels of specialisations. This cluster also showed fairly low levels in technological structure. Their complexity level for resource accessibility was also on the lower end, which may have resulted in the lower but reasonable complexity level for research capability.

As for the importance placed by this cluster on software function relating to the phases of the Intelligence Cycle, the production and design companies exhibited fairly low concerns with the first phase – identifying CI needs – but had a relatively fair level of interest in the second and third phase – acquisition
of information and organisation, storage, and retrieval. However, they showed a fairly low impression for
the analysis functions, which is the fourth phase. Functions relating to the last two phases – the
development and dissemination of CI reports – were also of fairly low concern, as the construction and
sharing the intelligence were not considered very important in their practice of CI.

Cluster 3 Telecommunications

Unlike the previous two clusters, the telecommunications cluster (18) had mixed characteristics of both
the entrepreneurial and ad hoc types, with a larger number of employees, which may have been mostly
divided into functional units, hence, the fairly high level of specialisation. However, this cluster did not
show evidence of high technological structure nor accessibility to monetary resources. Contrary to
anticipations, these companies did show a high complexity level for research capability.

As for the CI software, this cluster showed fair interest in the application being able to provide support in
identifying CI needs. Although it was assumed that the second and the third phase had positive
associations, this cluster had low complexity levels for software that could support the acquisition of
competitive information but showed fairly high levels of complexity for the organisation, storage and
retrieval phase of the intelligence cycle. Like cluster 2, there was less trust in software to support the
analysis. Also, these companies showed low interest in having functions that develop and distribute
competitive intelligence.

Cluster 4 Content development

Unlike any of the previous clusters, the content development cluster (25) had the closest affiliations with
the ad hoc SME. Like cluster 3, it had larger numbers of employees that may have grouped into
specialised units, which evidently produced high levels of complexity for specialisation. As anticipated,
groups with larger numbers and highly specialised had more complex technological structures, as well as
accessibility to resources and funds. However, this group did not lend itself to research capability, which
proved to have had low complexity levels.

For software, the results showed low complexity levels for the first phase – identification of CI needs –,
the second phase – acquisition of competitive information –, the third phase – organisation, storage, and
retrieval, and the fifth and sixth phase – development and distribution of CI products respectively. Interestingly, the only phase that this cluster hoped to gain from software was its analysis function, even though many practitioners agree that current analysis technologies only minutely provide support in analysing competitive information, as the activity is more of a human function.

Cluster 5 Education and training

The education and training cluster (20) exhibited low levels for number of employees, with limited specialisations. Their technological structure was fairly simple. This cluster also showed to have limited accessibility to resources, which probably resulted in a limited capability for research. These configurations mostly referred to the entrepreneurial SME structure.

The desired configurations for CI software for this cluster did not include its ability to identify CI needs, as the results illustrated a low complexity level for this phase of the intelligence cycle. They also had fairly low interests in software to support the acquisition, organisation, storage, and retrieval of competitive information – the second and third phases. Similar to cluster 4, the companies within this cluster showed more interest in the software for analysis. After analysing the information using the application, they also expected to use the software for developing reports on their findings and to be able to disseminate the information.

Cluster 6 Hardware and electronics design

The hardware and electronics design cluster (21) exhibited most closely to ad hoc SMEs. The size in terms of number of employees was of the most significant of the total respondents (though for this variable, there was a high level of variability, with a standard deviation of 1.35). Although this cluster was predominantly larger SMEs, these lack specialisation and seemed to prefer more multitasking employees with less defined job scopes. The other variables continued to exhibit the ad hoc configurations, where these companies proved to have had a complex technological structure, a high level of resource accessibility, and were thus fairly capable of research.

This cluster showed fairly high interest in software capabilities that help in acquiring competitive information, but exhibited less need for software that supports identifying CI needs. With software
support to acquire competitive information considered important, functions that organise, store, and retrieve that information was naturally considered of importance. Functions that analyse also held a fair regard from these companies. With that, this cluster would also appreciate software that help develop CI products, as well as its dissemination capabilities.

Although the averages for the variables in this cluster showed significance, most of the variables here (i.e. number of employees, resource accessibility, research capability, identification of CI Needs, acquisition of competitive information, organisation, storage and retrieval, and analysis of information), showed greater variability than for the population as a whole, with standard deviations of 1.35, 1.37, 1.16, 1.10, 1.26, 1.13, and 1.07 respectively.

**Cluster 7 Systems security**

The systems security cluster, which made the least number of respondents (8), mostly had a smaller number of staff, however, fairly specialised. They also showed evidence of fairly complex technological structures. Although SMEs under this cluster lack accessibility to resources, they were fairly capable of researching the competitive environment. Thus, this cluster mostly reflected what was, in effect, an *ad hoc* SME structure.

Their software preferences to support CI activities were primarily not in favour of capabilities that support identification of CI needs, but were fairly in favour of functions that acquire competitive information. Although acquiring information was considered important in software, the companies in this cluster showed significantly low interest in managing the acquired information. This cluster appropriately disregarded the analysis function. However, functions that help develop CI products were considered less useful, while distributing the information was of fairly high importance.

**Cluster 8 Systems integration**

These companies within the systems integration cluster (18) exhibited most closely to the entrepreneurial SME structure, with fewer staff, and with fairly low levels of specialisations. This cluster also displayed a fairly simple technological structure. However, although there were fewer employees, these companies had higher levels of resource accessibility, but were not concerned with research capability.
As for software requirements for CI, this cluster also showed a fairly low interest in software functions that help acquire their CI needs. Similarly, the acquisition of competitive information, and the organisation, storage, and retrieval of information variables did not receive a favourable response. However, like cluster 4 and 5, this cluster would also seek software support for analysing competitive information. These companies would also seek software support to create CI reports, as well as capabilities to distribute them.

**Cluster 9 Mobile and wireless technology**

The mobile and wireless technology cluster (23) mostly consisted of companies with larger numbers of employees. Similar to clusters 3 and 4, the employees may have had concentrated into specialised groups, which also produced high levels of complexity for specialisation. This cluster also showed evidence of fairly complex technological structure. However, the complexity levels for resource accessibility were low. On the other hand, they showed positive associations with research capabilities. This cluster mostly defined the *ad hoc* SME structure.

As for CI software functions, this cluster showed a fairly high interest in software functions that help assemble their CI needs, high interests on acquiring and organising and managing information functions, a fair level of concern for analysis support, and fairly high levels of importance placed on capabilities for producing and disseminating their CI.

**Cluster 10 Shared services**

The shared services cluster (29) demonstrated mixed configuration in terms of structure. They were predominantly companies with low numbers of employees, though fairly specialised. These companies also displayed a rather complex technological structure. However, the results showed a lack of accessibility to resources, which might have led to their low levels in research capability.

In terms of CI software needs, this cluster exhibited very similar requirements to cluster 5. The required software configurations for this cluster did not include its functions to highlight CI needs, as the results demonstrated a low complexity level for this phase of the intelligence cycle. Like cluster 5, they also had
fairly low interests in software to support the acquisition, organisation, storage, and retrieval of competitive information – the second and third phases. Also, the companies within this cluster showed more interest in the software for analysis; finally, the development and distribution of CI products was held in high regard.

**Cluster 11 Others**

The research recorded 11 companies under the ‘Others’ category and they were self-categorised as follows: business and technology consulting, IT consulting (three companies), intellectual property consulting, management services, human resource management solutions, business development and consulting, ezine, online publishing, and business consulting. The results for this group of companies were only partially analysed for possible supporting information.

The following Table 6.3 summarises the above interpretations and is structured to enable comparisons between clusters. Note that n = number of respondents. Also note that terms and/or descriptors (for example, low, fairly low, fairly high, and high) used to describe the structural and contextual characteristics are levels of complexity based on Table 6.2.
<table>
<thead>
<tr>
<th>Variable categories</th>
<th>Structural and Contextual Characteristics</th>
<th>Intelligence Cycle Value Placement in Software Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLUSTER (n)</strong></td>
<td></td>
<td></td>
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</tbody>
</table>
| Software developers (57) | - Closely exhibited the structural and contextual characteristics of the entrepreneurial SME.  
- Majority of companies have fewer staff.  
- Low specialisations.  
- Fairly simple technological structure.  
- Low accessibility to resources.  
- Fairly active in conducting competitive research. | - Fairly high interest in software functions that help highlight aspects of CI needs.  
- Fairly high interest in functions to acquire and organise, store and retrieve information.  
- Fair level of concern for analysis support capabilities.  
- Fair levels of importance being placed on producing and disseminating their CI findings. |
| Production & design (38) | - Also exhibited the structural and contextual characteristics of the entrepreneurial SME.  
- Fairly low levels in the number of employees.  
- Fairly low levels of specialisations.  
- Fairly low levels in technological structure.  
- Complexity level for resource accessibility was on the lower end.  
- Lower but reasonable complexity level for research capability. | - Exhibit fairly low concerns with the first phase – identifying CI needs.  
- Fair level of interest in the second and third phase – acquisition of information and organisation, storage, and retrieval.  
- Fairly low interest for the analysis functions (fifth phase).  
- The last two phases – the development and dissemination of CI reports – were not considered very important in their practice of CI. |
| Telecommunications (18) | - Mixed characteristics of both the entrepreneurial and ad hoc types.  
- Larger number of employees.  
- Fairly high level of specialisation.  
- Simple technological structure.  
- Low accessibility to monetary resources.  
- High complexity level for research capability | - Fair interests in the application being able to support in identifying CI needs.  
- Low complexity levels for software that can support the acquisition of competitive information but show fairly high levels of complexity for the organisation, storage and retrieval phase of the intelligence cycle.  
- Less trust in software to support the analysis.  
- Low interest in having functions that develop and distribute competitive intelligence. |
<table>
<thead>
<tr>
<th>Section</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| Content development (25)      | - Closest affiliations with the *ad hoc* SME.  
- Larger numbers of employees.  
- High levels of complexity for specialisation.  
- Complex technological structures.  
- High accessibility to resources and funds.  
- Low complexity levels for research capabilities.  |
|                               | - Low complexity levels for the first phase – identification of CI needs.  
- Low regard for the second phase – acquisition of competitive information, and the third phase – organisation, storage, and retrieval.  
- Fairly low interest in the fifth and sixth phase – development and distribution of CI products respectively.  
- Fairly high regard for analysis tasks in software.  |
| Education & training (20)     | - Exhibits low levels for number of employees, with limited specialisations.  
- Technological structure was fairly simple.  
- Limited accessibility to resources.  
- Limited capability for research.  
- Configurations mostly referred to the entrepreneurial SME structure.  |
|                               | - Would not include the ability to identify CI needs – first phase - in CI software.  
- Low interests in software to support the acquisition, organisation, storage, and retrieval of competitive information – the second and third phases.  
- More interest in the software for analysis.  
- Showed interest in developing reports on their findings and to be able to disseminate the information.  |
| Hardware/ electronics design (21) | - Exhibited most closely to *ad hoc* SMEs.  
- Number of employees is of the most significant of the total respondents.  
- Lack specialisation.  
- Prefer more multitasking employees with less defined job scopes.  
- Complex technological structure, a high level of resource accessibility, thus fairly capable of research.  |
|                               | - Exhibit less need for software that support identifying CI needs.  
- Fairly high interest in software capabilities that help in acquiring competitive information.  
- Acquiring competitive information considered important.  
- Functions that organise, store, and retrieve that information were considered important.  
- Functions that analyse also held in fair regard.  
- Appreciates software that helps develop CI products, as well as its dissemination.  |
| Systems security (8)          | - Smaller number of staff,  
- Fairly specialised  
- Fairly complex technological structures.  
- Lack accessibility to resources  
- Fairly capable of researching the competitive environment.  |
|                               | - Not in favour of capabilities that support identification of CI needs.  
- Fairly in favour of functions that acquire competitive information.  
- Significantly low interest in managing the acquired information.  
- Disregard the analysis function.  
- Functions that help develop CI products.  |
<table>
<thead>
<tr>
<th>Systems integration (18)</th>
<th>Exhibited most closely to the entrepreneurial SME structure.</th>
<th>Fairly low interest in software functions that help acquire their CI needs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fewer staff.</td>
<td>Low value placed in the acquisition of competitive information.</td>
</tr>
<tr>
<td></td>
<td>Fairly low levels of specialisations.</td>
<td>The organisation, storage, and retrieval of information variables did not receive a favorable response as an important software function.</td>
</tr>
<tr>
<td></td>
<td>Fairly simple technological structure.</td>
<td>Seek software support for analysing competitive information.</td>
</tr>
<tr>
<td></td>
<td>Higher levels of resource accessibility.</td>
<td>Seek software support to create CI reports.</td>
</tr>
<tr>
<td></td>
<td>Lack capability in conducting competitive research.</td>
<td>Values software with capabilities to distribute CI.</td>
</tr>
<tr>
<td>Mobile/ wireless technology (23)</td>
<td>Larger numbers of employees.</td>
<td>Showed fairly high interest in software functions that help assemble their CI needs.</td>
</tr>
<tr>
<td>(continued from previous page)</td>
<td>High levels of complexity for specialisation.</td>
<td>High interest on acquiring and organising and managing information functions – the second and third phases.</td>
</tr>
<tr>
<td></td>
<td>Showed evidence of fairly complex technological structure.</td>
<td>Fair level of concern for analysis support.</td>
</tr>
<tr>
<td></td>
<td>Complexity levels for resource accessibility were low.</td>
<td>Fairly high levels of importance placed on capabilities for producing and disseminating their CI – the fifth and sixth phase.</td>
</tr>
<tr>
<td></td>
<td>Showed positive associations with research capabilities.</td>
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</tr>
<tr>
<td></td>
<td>mostly defined the ad hoc SME structure.</td>
<td></td>
</tr>
<tr>
<td>Shared services (29)</td>
<td>Demonstrated mixed configuration in terms of structure.</td>
<td>Software configurations for this cluster would not include functions to highlight CI needs.</td>
</tr>
<tr>
<td></td>
<td>Predominantly companies with low numbers of employees.</td>
<td>Fairly low interest in software to support the acquisition, organisation, storage, and retrieval of competitive information – the second and third phases.</td>
</tr>
<tr>
<td></td>
<td>Employees with fairly specialised job scopes.</td>
<td>Showed significant interest in the software for analysis.</td>
</tr>
<tr>
<td></td>
<td>Displayed complex technological structure.</td>
<td>High regards were given for the development and distribution of CI products – the fifth and sixth phase.</td>
</tr>
<tr>
<td></td>
<td>Showed lack of accessibility to resources.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low levels in research capability.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.3: Interpretations of statistical analysis of questionnaire data
6.3 Interview Data Analysis

Functions of this aspect of the research were to enrich the analysis of the taxonomy of SMEs with qualitative data in the three aspects of key intelligence needs: business decisions and strategic topics, early warning topics, and key players.

6.3.1 Sample Selection and Methodology

The sample of companies incorporated in this stage of the analysis was selected in the following way. The 270 SMEs that were included in the questionnaire analysis represented the companies that had responded positively to requests to participate in the questionnaire survey study. SMEs having been clustered in homogeneous groups, the companies were selected from within the clusters of the taxonomy for further analysis on the basis of variation and of representing cases in each of the clusters where at least one company was to be incorporated. By selecting variation in the sample, it was intended to minimise any similarities deriving from the similar nature of business represented.

From these clustered groups of companies, participants from one company under each cluster were selected to form a focus group to provide supporting data about each cluster in terms of the three aspects of key intelligence needs. After the selection, the focus group was formed, which totalled to 12 executives. Considering the limited time and resources allocated for this research, the researcher would like to note that it was not possible to conduct interview that are representative of the population. The focus group consisting of senior executives from one company from each cluster was used to gather perceptions to support the data gathered from the more representative sample during the questionnaire survey. The executives interviewed are arranged alongside their respective clusters in Table 6.4 shown below.
Given that the focus of this part of the research was on qualitative analysis of explanations of the three aspects of KIT, semi-structured interviews were adopted as the major research tool. Chief Executive Offices (CEO) or their equivalent from the initial sample was approached to take part in interviews and twelve interviews were conducted. These lasted between one and two hours and were digitally recorded, and a sample transcription of response relating to key concepts is provided in Appendix 1, A1.6.

The interviews focused on key intelligence needs, and enabled the researcher to explore the meanings given to these variables from the perspectives of the CEOs and upper management in the SMEs. They provided detailed information about a significantly smaller number of cases than those investigated in the first part of the study and this in effect reduced the ability to draw general conclusions for all SMEs on the variables investigated. The research recognised that, due to constraints of time and resources, the input gathered and analyses represent only one to two views of ‘SME reality’ for each cluster group. Furthermore, reliability of data, in terms of obtaining frank and honest responses, was pursued by underlining the academic research orientation of the investigation and the promise that the data would only be used for these purposes. Semi-structured interviews, according to Frankfort-Nachmias and Nachmias268, are suitable for investigations where interviewees have been involved in the particular experiences under study, and when the respondents’ experiences of the situations are sought. During the interviews, the researcher tried to explain and clarify questions that were misunderstood, while avoiding wording them in such a way that might lead the interviewee to particular answers. As regards data analysis, an identification of important themes and essential features of the responses was sought.

Following Patton\textsuperscript{269}, data organisation and interpretation was achieved by a three stage process: 1) data reduction to meaningful and concise points, 2) data display in organised charts reporting responses of each SME, and 3) data interpretation where comparisons between SMEs were made, interrelationships among variables identified, and conclusions drawn.

6.3.2 Operationalisation of Concepts

The KIT interviews generated data relating to CEOs' perceptions of management processes rather than direct observation by the researcher within the company itself, and this must be recognised as a characteristic feature of the data. Nevertheless, respondents were often able to point to substantial materials (in, for example, company documents and records) to support their claims and the interviewer was thoroughly briefed in relation to the history, structure and \textit{modus operandi} of the company prior to interview, so that anomalies identified during the interview might be explored and accounted for.

The investigated variables included the following:

1) **Strategic decisions and actions**

Four elements of business decision and strategic and tactical topics provided the focus for this element of the interview:

- the decisions and actions faced within one year where competitive information could make a significant difference;
- the types of competitive information needed for strategic decision;
- the approach towards using competitive information;
- the time frame for the use of competitive information.

2) **Early warning**

The information sought in respect of this variable related to:

- recent unexpected events within the industry, business, or company;
- provisions for prevention and anticipation of future events that affect the company;
- list of events that pose threats to the company;
- types of competitive information needed to help in forecasting events.

3) **Key players**

This area of questioning sought to establish:

- the key competitors and other competitive elements within the marketplace that the company need to better understand;
- aspects of the key players that the company need to know;
- means of using the competitive information about key players.

### 6.3.3 Analysis of Findings

Discussion of the findings in this section treated each of the clusters identified in turn. Each case provided detailed descriptions of the findings for strategic decisions and actions topics, early warnings topics, and key players topics. Due to the relatively small number of respondents in the focus group, the interview responses were transcribed, interpreted, and analysed manually, that is, without the support of qualitative analysis tools, such as NVivo or similar. The following paragraphs discuss and interpret the interviews that took place. This is followed by Tables 6.5a and 6.5b that provide a summary of the characteristics of the clusters in respect of the investigated variables. Such listings of the cluster profiles enable a comparison among the ten types. A sample of the recorded data is found in Appendix 1, A1.6.

**Interview with a Manager from the Software developers Cluster**

The analysis of the findings from the interview of management level employee representing this cluster revealed that, in terms of business decisions and strategic topics, the software developers’ cluster had several foci. First, companies in this cluster aimed to expand their products and services into different areas in software development. This approach enabled these companies to have had more varied target markets. A short to medium-term strategic plan resulting from expansion was to be able to find out what the company should specialise in from gained experiences and working with prospective customers within the next one to three years. In other words, market experience and the nature of their customers for the next few years should determine their niche. The second focus was the cash requirements for executing the expansion, which most likely to involve the investment community without having to sacrifice a significant amount of control over company decisions. The first and second foci related to the third focus, which was to be consistently in the know about critical industry investments made by other
companies, and the cash requirements of other industry companies towards their expansion goals, as well as their investment choices, such as other companies' investors, alliances, and acquisitions.

According to the interviewee, competitive information pertaining to investments made by competitors had been gathered from employees who liaised with the industry and with financial institutions. Some information was also obtained from the Internet and trade magazines, although current news and investment information on Malaysian SMEs from published sources were scarce and less dependable. However, online information and publications were valued for providing information on the latest trends and current product releases in the global market. For companies that were involved in international alliances, joint ventures, and franchising, the Internet was the main source for this information.

The information gathered on competitors' involvements in the investment community and other types of investment was used to structure future investment strategy towards expanding the company's products and services. Information on successful investment decisions as well as any investment mistakes was analysed for what was to be gained and avoided. In particular, this information was used to chart directions to the right types of investors who were already interested and experienced in the specific areas of expansion and were willing to take the appropriate actions and risks. On the other end, however, the manager stressed that foul play in the investment community was very common; hence there was a need for a mature view on the prospective investors. Decisions on prospective investors could be supported by accurate information to help steer clear of being on the losing end of contracts and deals being made, as many investors were often larger firms that were experienced in taking advantage of smaller, often desperate smaller firms.

When asked about a time frame for this information to be used, the manager believed that information on competitors' investment decisions and the investment community should be updated as soon as there are any changes. He added that just-in-time information was crucial for SMEs as preparations and changes in strategic approaches depended heavily on all external events.

In terms of early-warning topics, the manager declared that companies from the software developers' cluster were at the mercy of technological shifts and constant changes in customer perceptions on 'our' products and services. Although technological "breakthroughs" were considered important in the development of industry, these events had caused drastic changes and shifts in the software marketplace.
Only in a few cases were companies able to sustain their place in the market while others struggled to break into the market only to find another product launched, which caused their own approach obsolete. Relatively, a company from this cluster could do as much as creating an entire line of new software products along with marketing efforts to secure product positioning in the market, however, most of these cases were overturned by another product line that was heavily invested but just as temporary.

A scenario was given to the manager interviewed given where intelligence was gained and the company was able to anticipate the market's next move for a product. In this scenario, an appropriate move may be to launch a product or a product line that was flexible to changes in both customer needs and future developments. However, it was stressed that, in terms of direct competition with a software product, this was an impossibility as changes occur too often. Nevertheless, competitive information comes in forms of clues and from trends from augmenting products, which makes it possible to predict certain aspects of movements in the market. One recent example was the new developments in hardware, such as the PDA (Personal Digital Assistant), and other mobile/portable alternatives to the computer, which then allowed smaller companies to start afresh in developing scaled down versions of larger applications.

Key players in the software industry had been dominated by larger firms and multinational companies. While these organisations were constant threats to smaller firms on many levels, they were often also considered prospective clients in need of outsourcing support and as acting middlepersons for a larger market reach. Valuable information about these large firms included their capabilities and whether any of the applications and services could be further augmented by the skills and ideas of smaller firms. In this regard, related competitive information included other companies competing for the same contracts. These samples of key player information would be useful for gaining better perspective on competitors and clients, thus providing a more prepared approach to succeed in a contract tender.

Interview with Two Managers from Two Companies from the Production and Design (Postproduction/animation/graphic design) Cluster

In the interviews with two management staff from two different companies representing the production cluster, both managers noted that business decisions linked to competitive information to be made within the next year relate to the provision of a unique but effective approach to post production work and design. Uniqueness in production and design was important to help clients in creating an identity for the
company and their products and services. Creating a strong unique presence in the production cluster was a crucial element in competitive strategy towards gaining reputable prospective clients. Gaining a reputable client meant market sustainability, greater exposure and improved reputation. Information needed to support strategic decisions and issues includes knowing how clients want to be perceived, which could be gained from annual reports, mission statements and corporate visions. In terms of standards and quality in postproduction and design, knowledge of competitors’ creative capabilities and skills was essential for tactical decisions. Other aspects of competitive information needed in this cluster included clients’ preferred viewing formats in the finished product, computer animation capabilities and implementation, target audiences, complexity in message delivery, cultural acceptance, and censorship.

In terms of early warning topics, design and postproduction preferences of clients were difficult to anticipate, and even when correctly anticipated, other external factors could still cause changes to occur. The problem for both these companies was that they specialised in creative products and services, but realised that they did not have employees who were actively seeking information on aspects of regulations and laws, proper marketing methods, and business structure, which were responsible for most of the ‘surprises’ they experience. It was believed that these ‘surprises’ could be reduced to their advantage if proper gathering and use of competitive information was initiated.

Key players in this field were competing and outsourcing graphic design firms, production and postproduction houses, animation companies and advertising firms, and large organisations with an interest in graphical image development and postproduction advertising.

*Interview with a Manager from the Telecommunications Cluster*

The interview with a management staff who represented a company within the telecommunications cluster conveyed that there had been high levels of concern for pricing, where maintaining a client was mostly based on consistently projecting services that were cost efficient. According to the telecommunications manager interviewed, however, the common concern to give the best deals to consumers and businesses had become more of a concern than ever due to up-and-coming alternative methods of communications that had been expanding rapidly, particularly relating to the Internet. This type of communication was now known as the web phone. The web phone was started by VoIP, offering PC-to-PC and PC-to-telephone and mobiles for lower prices than traditional telephones. In 1999, Marceau
and Sawka of Deloitte Consulting published an article in *CI Review* (10[4], p. 30) predicting this event, which stated, “the technological evolution is driving radical changes in the (telecommunications) industry; the Internet is changing its economics as new entrants build networks optimised to carry Internet traffic and as IP (Internet Protocol) networks are used to carry both voice and data”\(^{270}\). This concern brought the interview to issues of strategic decisions, which led to the reassessment of competitors and consumers, and their responses towards the new Internet based telecommunication companies. The telecommunications manager agreed that most companies in the telecommunications industry should be looking at a major restructuring within the next three to five years.

This type of competitive information was usually gathered from employees that actively communicate with acquaintances within the industry, and by attending telecommunications technology exhibitions, which had been held annually in Kuala Lumpur and Singapore. According to the interviewee, for companies that were ready to converge, the information gathered on the new technology could be used to develop new telecommunication products and services to break into a new market of Internet communications technology users.

With the realisation of the web phone, the main early-warning topic would be the areas of technological breakthrough that could dramatically affect the current and future competitiveness of all companies in the telecommunications industry. According to the manager, there had been announcements of the Internet phone and its capabilities but the phone had not been as widely used, hence the technology’s existence was not the intelligence needed. The intelligence needed was the growing number of users being less dependent on the traditional telephone and switching to the Internet phone. However, the manager interviewed felt that there should not be a total convergence to the technology yet, at the same time, it should not be ignored. Instead, there should be a co-existence between the two technologies, which from a competitive viewpoint, enables the provider to take advantage of the opportunity to offer a wider range of telecommunications services online to international users.

Key players in the telecommunications industry were Telekom Malaysia, the country’s largest telecommunications operator, the mobile and wireless service providers, and a large and untraceable number of ISPs (Internet Service Providers). Usually, any product relating to telecommunications in

Malaysia had to be approved by Telekom Malaysia (a regulatory semi-government body) before it could be offered to consumers as a final product. Constant updates on regulations should be arranged as there had been many changes in terms of technological advancements in the global telecommunications industry. Additionally, the manager stressed that activities in the international telecommunications arena, mobile and wireless technology industry and the telecommunications-related ISPs should also be closely monitored for new product launches, pricing movements and offers, and new technology announcements and releases.

*Interview with a Director of Public Relations and Marketing from the Content development Cluster*

The small and medium-sized companies in the content development cluster were generally involved with web content development, where it included the process of researching, writing, gathering, organising, and editing information (usually consisted of prose, graphics, pictures, recordings, movies or other media assets) for publication on web sites. In gathering the key intelligence needs in the content development cluster, the Director of Public Relations and Marketing who represented the content development companies was interviewed. He revealed that the web content industry cluster was similar to the production and design cluster as both work with creative products and services. However, unlike the production and design cluster, the strategic objective was to have flexibility in design approach and less consideration for unique and distinctive styles. According to the Director interviewed, the key in the industry, and likely strategic direction within the next year, were constantly improving the skill and capability for variation and multiplicity. Further information related to the local content development scene which could be gathered from the company websites; sometimes, portfolios of the developers were published online for publicity and marketing purposes. With knowledge of current trends in content design, standards could be maintained or improved towards an appropriate level to sustain marketability.

Like anything related to the Internet, technologies for content development were constantly changing and advancing. With advancements in online editing, animation applications for web pages, publishing applications and web page-building software, customers in the industry were becoming less dependent on the services that could be provided by companies in the industry. Many publications had predicted that many of the services offered in the web development field could soon be a common skill, which was said to be something to prepare for and not be “surprised” by.
According to the Director interviewed, information was needed on the key players and competitors in the content development industry cluster. These were SMEs within the cluster, larger content firms, and freelance web content developers.

**Interview with a Director of Academic Affairs from the Education and Training Cluster**

The analysis of the information gathered from an interview with Director of Academic Affairs of a private college revealed that the strategic decisions and actions were mostly concerned with the marketing of degree programmes and executive training packages, competitive pricing, and a certifiable reputation and academic standards. The director realised that, to keep abreast with trends in these aspects, there needed to be constant awareness of competitors’ progression. The college’s strategic decisions within the next year would be based on the changes in programmes offered for executives. Recent trends had shown significant shifts in academic and professional courses consisting of executive certificates, diplomas, and degrees with the organising of hybrid packages combining technical training, such as information technology-related courses and programming, with slightly modified upmarket renditions of management and business courses. Furthermore, the findings revealed that since private colleges tend to be expensive, the quality of the products and services has to reflect their pricing structure.

According to the Director interviewed, related information in the education and training industry could be gathered and monitored through changes on websites. For colleges and academic institutes, the website has been a valuable tool to update students and prospective students of the most current programme packages, as well as forthcoming courses and degree programmes. Additionally, academic staff often had acquaintances in other institutions and colleges with whom they shared notes and teaching approaches, which could be gathered and managed for decision-making purposes. Other sources of information on products and services offered in these colleges could be found in their own marketing materials, such as their prospectuses, brochures, as well as local magazines and publications on higher education and professional training, which could also give some perspective on current well-received programmes available in the higher education and training market.

The interview findings also revealed that the most recent unexpected event was the rather sudden unveiling of a college branch at an international location by a prominent competitor, which negatively affected the other colleges that did not offer the same option as it resulted in clear distinctions between the
colleges. If prior intelligence had been obtained, there could have been some preparation to move in the direction of establishing a similar international branch, along with a proper marketing campaign. When asked about ways to anticipate similar incidences, the interviewee admitted the difficulty in predicting specially guarded moves as such tactics were intentionally used to radically position and differentiate the company from the rest.

Key players in the industry included the National Accreditation Board, the Ministry of Higher Education, and all the colleges and universities in the country. It is especially important to alert the government bodies mentioned because of the generous monetary and consulting support they have been giving to small and medium-sized colleges on the rise.

Interview with a Senior Manager of Marketing and a Chief Executive Officer from the Hardware and Electronics Design Cluster

Interviews with two management staff (one senior manager in Marketing and one Chief Executive Officer) who represented two different companies within the this cluster clarified that hardware and electronics design was related to an application of industrial design with considerable engineering and technology awareness alongside human factors, (the product’s usability, ergonomics, and aesthetics). From a strategic angle, the marketing manager often made decisions around the topics of brand building, technological advances in design and manufacturing, suppliers and transportation logistics. The CEO, also a designer, oversaw all aspects of the company, but especially handled the communications aspect as it dealt more closely with key players in the industry, contracted clients and other companies looking for work to be commissioned, outsourcing-seeking companies, suppliers, and transportation.

Uniquely, the marketing manager gathered most of the information related to decision-making at a research centre that had dealt with hardware design situated at Multimedia University, an academic and research institute of higher education within the vicinity, and from suppliers. The University liaised with the company to have access to models and prototypes; at the same time, the manager was kept informed on the state of the art and advances in the field. In addition, valuable information regarding the industry was mostly gathered from suppliers. The CEO representing this cluster gathered competitive information from acquaintances in the industry, clients, and suppliers about industry trends, market trends, and on competitors.
In terms of early-warning topics, both the CEO and marketing manager agreed that there should be extra attention placed on forthcoming strategic alliances with larger multinational companies who might be interested in working with or acquiring smaller companies to be their hardware and electronics design arm. The reason for this was the increasing interest of these internationally based companies in extending their product design divisions to companies in Asian countries for cost-saving purposes. The CEO cited basic economics, "a manufacturer's profitability is dependent on the price a product can command in a marketplace and the cost to produce it". However, according to the CEO interviewed, another growing trend was that well-marketed and good hardware and electronics product design had begun to command a premium price amongst a "crowded shelf" of mediocre designs and prototypes.

Interview with the Chief Executive Officer from the Systems Security Cluster

To address the key intelligence needs of companies under the systems security cluster, a newly appointed CEO of a company representing this cluster was interviewed. The interview conveyed that the systems security industry had expanded and broken into many different product and service divisions and types, so much so that the competitive issues had been unclear during the last decade. Products and services offered by companies in this cluster included intrusion detection systems, electronic access control, remote monitoring systems, and fire and safety detection systems. Although system security companies could be broken down into many different types of products for different target markets, like the hardware and electronic product design cluster, larger multinational companies had been initiating multi-million dollar acquisitions of smaller companies with the objective of economies of scale by structuring a comprehensive multi-service organisation. Therefore, the strategic decisions and early-warning topics were associated with movements on mergers, acquisitions, and strategic alliances in the industry. In addition, brand development had also been a newly formed strategic concern for companies that were moving towards strategic alliances.

According to the CEO, industry information regarding mergers and alliances were found on the Internet, newspapers and other popular media. However, competitive information to help anticipate these events could only be gathered by liaising with people in the industry; often through informal discussions and exchanging of news on current industry "gossip". The CEO interviewed stressed that, although the
information is gathered informally, it should be managed and extracted to be used to make decisions on
the company's next move.

Key players that affected SMEs in the systems security industry were the competitors, the customers, and
the larger firms, both as clients and partners. When asked to be more specific on the competitors and
customers, the CEO explained that information on competitors should be clearly defined as the products
and services offered could vary, and not be regarded, therefore, as in direct competition. The customers
should also be closely monitored in terms of geographic location. By accessing publicly available
resources, the customers' addresses could be categorised according to rates of trespassers and burglaries
within that area.

*Interview with a Chief Executive Officer from the Systems Integration Cluster*

The interview with the Chief Executive Officer revealed that the systems integration industry had grown
to be extremely competitive with products geared to many information-related areas, such knowledge
management, collaborative technologies, and different versions of competitive intelligence integrated
systems. However, although the products came under different names, he admitted that the objective for
these companies were very similar and could be applied and customised according to their customers'
needs. Although there were many textbook approaches to systems integration, the representing CEO
explained that the products in the industry mainly came in two forms: process integration and common
façade. Process integration links business processes across applications. The common façade approach is
integrating an application that acted as a front-end to manage a group of various applications, which
provided a single consistent access interface to these applications and shielding users from having to learn
to interact with different applications.

Unlike the systems security cluster, the competitors within this industry were clear, as products and
services were similar in nature. The only differences were the companies' capabilities and expertise, and
the after-sales support and maintenance. Relatively, in terms of customers, companies in need of such
services often demanded to work with established and dependable companies with commendable
portfolios and representing well-known products, as the integrated systems would need constant
monitoring and maintenance, often throughout the life of the product. Therefore, the strategic aim of the
companies within this cluster was to establish their brand and reputation for good service.
When asked about early-warning topics, the CEO interviewed noted the possibilities for companies to become vulnerable to changes in related technologies. Therefore, he stressed the importance of closely monitoring the competitive environment and keeping flexible to changes. This information on the industry and competitors could be monitored by being alert to changes in the company websites, as well as subscribing to related literature and publications specialising in future technologies in the field.

*Interview with a Chief Technology Officer from the Mobile and Wireless Technology Cluster*

In analysing the findings for key intelligence needs of SMEs in the mobile and wireless technology sector, the interview with a Chief Technology Officer who represented this cluster revealed that, in terms of business decisions, the company placed high priority on two main activities in their competitive environment. Firstly, similar to the findings of SMEs in the telecommunications cluster, attention had been greatly placed on the "race" in technology product releases and movements in services provided by service providers. Recent mobile service technology "breakthroughs" such as high bandwidth, wireless mobile Internet service and face-to-face mobile conference calling capabilities tended to keep mobile service providers "on their toes" with each others' activities. In addition to the advancements in mobile services, and the related hardware (mobile phones, wireless and mobile Internet-enabled handhelds, PDAs, etc.) there had also been a constant watch for advancements, such as the recent advancements of 3G (high bandwidth Internet-enabled phones with video conferencing capabilities), advanced video and photo capturing capabilities, and high storage space. Secondly, the CTO interviewed revealed that there might be a possibility of strategic alliances with international mobile service providers. This possibility was anticipated due to several acquisitions and alliances that had progressed within the software industry, many with SMEs. These alliances had been taking place because of the growing interest of international companies in breaking into the Southeast Asian ICT markets, and high prospects for Malaysian SMEs to break into international markets.

According to the interviewee, some aspects of the industry could be anticipated by paying proper attention to other sectors in the industry. Information of the two aspects of the competitive environment was usually available on the Internet by monitoring websites of related companies. In addition, the companies of this cluster should continue to be actively involved in technology exhibitions and industry
conferences where previews of product launches and informal conversations on market movements could occur.

The CTO who represented mobile and wireless technology cluster revealed that there was always a possibility for SMEs in this sector to be ‘surprised’ by a new product or service launched by a larger firm that could threaten the smaller companies. Prior intelligence in this aspect would be significantly valued. At the same time, however, the CTO stressed that flexibility of change in company structure and strategic decisions were of equal importance as intelligence without the capability to take immediately action was without worth. Proper competitive intelligence was gathered but lack of management of such information and the inability to place it in perspective often resulted in the information remaining as meaningless data. The CTO conveyed that software to manage these types of information was necessary for effective decision-making.

Key players in this cluster included the direct competitors, the vendors and manufacturers of mobile hardware and electronic products, and Telekom Malaysia. Competitors were closely monitored for changes in pricing and product packages; new products released by vendors of mobile products were equally important in anticipating the movements of mobile and wireless industry; and Telekom Malaysia was the regulatory organisation for changes in related laws and regulations.

*Interview with a Managing Director from the Shared services Cluster*

The current situation with Malaysian SMEs in the shared services industry under the MSC was that the companies were formed mostly by larger firms to play a supportive role as a cost-saving mechanism. By definition, the shared services company were developed for consolidating and streamlining of an (parent) organisation’s functions to ensure that they deliver the organisation the services required of them as effectively and efficiently as possible. Most of the companies in this cluster were either considered strategic partnerships or joint initiatives, where the former arranged outsourcing contractual arrangements that offered a range of services related to the client company; and the latter were formed from agreements between two or more organisations to set up and operate a shared services company. In other words, most of the companies were heavily dependent on the client companies that formed them to stay in business. Certainly, in analysing the findings for key intelligence needs of SMEs in the shared services sector, the interview with a Managing Director who represented this cluster revealed that, in terms of business
decisions, the company placed priority on anticipating their clients’ needs and constantly improving their services in accordance to the related changes within the larger organisation.

From a competitive standpoint, although they were considered to be extensions of the larger companies, part of the cost-saving mechanism was that the shared services establishments were made to be separate entities. According to the managing director, this arrangement made it possible for the companies to be vulnerable to other companies that were able to give similar but better services, just as any companies were vulnerable to competitors and other external forces. Information to help anticipate the client’s requirements could be gathered by closely liaising with officers and managers from the various departments within the associated organisation.
<table>
<thead>
<tr>
<th>KIT Variables</th>
<th>Strategic Decision and Issues</th>
<th>Early Warning</th>
<th>Key Players</th>
</tr>
</thead>
</table>
| Manager - Software Developers | - Companies in this cluster aim to expand their products and services into different areas.  
- The second focus is the cash requirements for executing the expansion  
- The third focus is to consistently be in the know about critical industry investments made by other companies | - Companies from the software developers' cluster are at the mercy of technological shifts and constant changes in customer perceptions on 'our' products and services | - larger firms and multinational companies to be constant threats |
| Two Managers - Production & Design | - Strategy was to provide a unique but effective approach to post production work and design.  
- Creating a strong unique presence in the production cluster is crucial to be part of competitive strategy towards gaining reputable prospective clients. | - Preferences of clients are difficult to anticipate, and even when correctly anticipated, other external factors can still cause changes to occur. | - competing and outsourcing graphic design firms, postproduction houses, animation companies, and large organisation that have interest in graphical image development. |
| Manager - Telecom | - Concern for pricing, where maintaining a client is mostly based on consistently projecting services that are cost efficient.  
- Reassessment of competitors and consumers, and their responses towards the new Internet based telecommunication companies. | - Growing number of users being less dependent on the traditional telephone and switching to the Internet phone. | - Telekom Malaysia, the country's largest telecommunications operator, the mobile and wireless service providers, and ISPs (Internet Service Providers). |
| Director of PR & Marketing - Content Development | - Strategic objective was to have flexibility in design approach and less consideration for unique and distinctive styles.  
- Constantly improving the skill and capability for variation in products. | - Rapid advancements in online editing, animation applications for web pages, publishing applications and web page-building software. | - Focus on the competitors, which consist of the SMEs within the cluster, larger content firms, and freelance web content developers. |
| Director of Academic Affairs - Education & Training | - concerned with the marketing of degree programmes and executive training packages, competitive pricing, and a certifiable reputation and academic standards. | - unveiling of a college branch at an international location by a prominent competitor | - Key players in the industry include the National Accreditation Board, the Ministry of Higher Education, and all the colleges and universities in the country. |

Table 6.5a: A Description of the KIT Variables Reported by Interviewees for Each Cluster (Part 1)
<table>
<thead>
<tr>
<th>KIT Variables</th>
<th>Strategic Decision and Issues</th>
<th>Early Warning</th>
<th>Key Players</th>
</tr>
</thead>
</table>
| Senior Manager & CEO - Hardware/ Electronics Design | - Marketing manager concerned for brand building, technological advances in design and manufacturing, suppliers and transportation logistics.  
- The CEO concerned with communications aspect as it deals more closely with key stakeholders. | - Possible alliances with multinationals.  
- There was increasing interest for international-based companies to extend their product design divisions to Asia for cost saving purposes. | - Key players in the industry, which consisted of contracted clients and other companies looking for work to be commissioned, outsourcing-seeking companies, suppliers, and transportation. |
| CEO - Systems Security | - Brand development as strategic concern for companies that were moving towards strategic alliances. | - Multinational companies initiating multi-million dollar acquisitions of smaller companies with the objective of the economies of scale by structuring a comprehensive multi-service organisation. | - Competitors, the customers, and the larger firms, both as clients and partners. |
| CEO - Systems Integration | - Objective for these companies could be applied and customised according to their customers’ needs.  
- The strategic aim of the companies within this cluster was to establish their brand and reputation for good service. | - Possibilities for companies to become vulnerable to changes in related technologies. | - Direct competitors and customers. |
| CTO - Mobile/ wireless tech | - Attention to be placed on the “race” in technology product releases and movements in services provided by service providers. | - New product or service launched by a larger firm that could threaten the smaller companies. | - The direct competitors, the vendors and manufacturers of mobile hardware and electronic products, and Telekom Malaysia. |
| Managing Director - Shared Services | - Aimed to anticipate their clients’ needs and constantly improving their services in accordance to the related changes within the larger organisation. | - Being a separate company from the organisation that formed it made it possible for the company vulnerable to other companies that are able to give similar but better services. | - The organisation that formed the companies in the cluster, and other shared services companies. |

Table 6.5b: A Description of the KIT Variables Reported by Interviewees for Each Cluster (Part 2)
6.4 Findings – Developing a Taxonomy

The regrouping of the findings from the questionnaire and the interview led to the construction of the Taxonomy of Competitive Intelligence Configurations for MSC-status Small and Medium-sized Enterprises in Malaysia (Table 6.6, below), which was one of the main contributions of this research project. Based on Table 6.6 below, the paragraphs that follow discuss the overall nature of each cluster in terms of structural and contextual characteristics, Intelligence Cycle values in CI software, and key intelligence needs. These aspects of SMEs were then put in perspective to illustrate and give an overall view of its environments and characteristics in simulating their possible approaches and uses in CI software.
<table>
<thead>
<tr>
<th>Variable categories</th>
<th>Structural and Contextual Characteristics</th>
<th>Intelligence Cycle Value Placement in Software Functions</th>
<th>Key Intelligence Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLUSTER (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Software developers (57) | - Closely exhibited the structural and contextual characteristics of the entrepreneurial SME.  
- Majority of companies have fewer staff.  
- Low specialisations.  
- Fairly simple technological structure.  
- Low accessibility to resources.  
- Fairly active in conducting competitive research. | - Fairly high interest in software functions that help highlight aspects of Cl needs.  
- Fairly high interest in functions to acquire and organise, store and retrieve information.  
- Fair level of concern for analysis support capabilities.  
- Fair levels of importance being placed on producing and disseminating their Cl findings. | - **Strategic decisions** - aim to expand their products and services into different areas, (focus is the cash requirements for executing the expansion.), and monitor critical industry investments made by other companies.  
- **Early warning** - technological shifts and constant changes in customer perceptions on 'our' products and services.  
- **Key players** - larger firms and multinational companies to be constant threats. |
| Production & design (38) | - Also exhibited the structural and contextual characteristics of the entrepreneurial SME.  
- Fairly low levels in the number of employees.  
- Fairly low levels of specialisations.  
- Fairly low levels in technological structure.  
- Complexity level for resource accessibility was on the lower end.  
- Lower but reasonable complexity level for research capability. | - Exhibit fairly low concerns with the first phase – identifying Cl needs.  
- Fair level of interest in the second and third phase – acquisition of information and organisation, storage, and retrieval.  
- Fairly low interest for the analysis functions (fifth phase).  
- The last two phases - the development and dissemination of Cl reports - were not considered very important in their Cl practice. | - **Strategic decision** - to provide a unique but effective approach to post production work and design, creating a strong unique presence in the production cluster.  
- **Early Warning** - Preferences of clients are difficult to anticipate, and even when correctly anticipated, other external factors can still cause changes to occur.  
- **Key players** - competing and outsourcing graphic design firms, postproduction houses, animation companies, and large organisation that have interest in graphical image development. |
<table>
<thead>
<tr>
<th>Telecommunications (18)</th>
<th>Content development (25)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mixed characteristics of both the entrepreneurial and ad hoc types.</strong></td>
<td><strong>Closest affiliations with the ad hoc SME.</strong></td>
</tr>
<tr>
<td><strong>Larger number of employees.</strong></td>
<td><strong>Larger numbers of employees.</strong></td>
</tr>
<tr>
<td><strong>Fairly high level of specialisation.</strong></td>
<td><strong>High levels of complexity for specialisation.</strong></td>
</tr>
<tr>
<td><strong>Simple technological structure.</strong></td>
<td><strong>Complex technological structures.</strong></td>
</tr>
<tr>
<td><strong>Low accessibility to monetary resources.</strong></td>
<td><strong>High accessibility to resources and funds.</strong></td>
</tr>
<tr>
<td><strong>High complexity level for research capability</strong></td>
<td><strong>Low complexity levels for research capabilities.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Telecommunications</th>
<th>Content development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fair interests in the application being able to support in identifying CI needs.</strong></td>
<td><strong>Low complexity levels for the first phase – identification of CI needs.</strong></td>
</tr>
<tr>
<td><strong>Low complexity levels for software that can support the acquisition of competitive information but show fairly high levels of complexity for the organisation, storage and retrieval phase of the intelligence cycle.</strong></td>
<td><strong>Low regard for the second phase – acquisition of competitive information –, and the third phase – organisation, storage, and retrieval</strong></td>
</tr>
<tr>
<td><strong>Less trust in software to support the analysis.</strong></td>
<td><strong>Fairly low interest in the fifth and sixth phase – development and distribution of CI products respectively.</strong></td>
</tr>
<tr>
<td><strong>Low interest in having functions that develop and distribute competitive intelligence.</strong></td>
<td><strong>Fairly high regard for analysis tasks in software.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Telecommunications</th>
<th>Content development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic decisions - Concern for pricing, where maintaining a client is mostly based on consistently projecting services that are cost efficient, and the reassessment of competitors and consumers, and their responses towards the new Internet based telecommunication companies.</strong></td>
<td><strong>Strategic decisions – Strategic objective was to have flexibility in design approach and less consideration for unique and distinctive styles. However, they strive to improve the skill and capability for variation in products.</strong></td>
</tr>
<tr>
<td><strong>Early Warning - Growing number of users being less dependent on the traditional telephone and switching to the Internet phone.</strong></td>
<td><strong>Early Warning – Rapid advancements in online editing, animation applications for web pages, publishing applications and web page-building software.</strong></td>
</tr>
<tr>
<td><strong>Key players - Telekom Malaysia, the country's largest telecommunications operator, the mobile and wireless service providers, and ISPs (Internet Service Providers).</strong></td>
<td><strong>Key players – Focus on competitors, which are the SMEs within the cluster, larger content firms, and freelance web content developers.</strong></td>
</tr>
<tr>
<td>Education &amp; training (20)</td>
<td>Hardware/ electronics design (21)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Exhibits low levels for number of employees, with limited specialisations.</td>
<td>Exhibit most closely to \textit{ad hoc} SMEs.</td>
</tr>
<tr>
<td>Technological structure was fairly simple.</td>
<td>Number of employees is of the most significant of the total respondents.</td>
</tr>
<tr>
<td>Limited accessibility to resources.</td>
<td>Lack specialisation.</td>
</tr>
<tr>
<td>Limited capability for research.</td>
<td>Prefer more multitasking employees with less defined job scopes.</td>
</tr>
<tr>
<td>Configurations mostly referred to the entrepreneurial SME structure.</td>
<td>Complex technological structure, a high level of resource accessibility, thus fairly capable of research.</td>
</tr>
<tr>
<td>Would not include the ability to identify CI needs — first phase — in CI software.</td>
<td>Exhibit less need for software that support identifying CI needs.</td>
</tr>
<tr>
<td>Low interests in software to support the acquisition, organisation, storage, and retrieval of competitive information — the second and third phases.</td>
<td>Fairly high interest in software capabilities that help in acquiring competitive information.</td>
</tr>
<tr>
<td>More interest in the software for analysis.</td>
<td>Acquiring competitive information considered important.</td>
</tr>
<tr>
<td>Showed interest in developing reports on their findings and to be able to disseminate the information.</td>
<td>Functions that organise, store, and retrieve that information were considered important.</td>
</tr>
<tr>
<td></td>
<td>Functions that analyse also held in fair regard.</td>
</tr>
<tr>
<td></td>
<td>Appreciates software that helps develop CI products, as well as its dissemination.</td>
</tr>
<tr>
<td>Strategic decisions — concerned with the marketing of degree programmes and executive training packages, competitive pricing, and a certifiable reputation and academic standards.</td>
<td>Strategic decisions — Marketing manager concerned with brand building, technological advances in design and manufacturing, suppliers and transportation logistics, and the CEO concerned with communications aspect as it deals more closely with key stakeholders.</td>
</tr>
<tr>
<td>Early Warning — unveiling of a college branch at an international location by a prominent competitor.</td>
<td>Early Warning — Possible alliances with multinationals, and the increasing interest for international-based companies to extend their product design divisions to Asia for cost saving purposes.</td>
</tr>
<tr>
<td>Key players — Key players in the industry include the National Accreditation Board, the Ministry of Higher Education, and all the colleges and universities in the country.</td>
<td>Key players — Contracted clients and other companies looking for work to be commissioned, outsourcing-seeking companies, suppliers, and transportation.</td>
</tr>
<tr>
<td>Systems security (8) (continued from previous page)</td>
<td>Systems integration (18)</td>
</tr>
<tr>
<td>---</td>
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</tr>
</tbody>
</table>
| - Smaller number of staff,  
- Fairly specialised  
- Fairly complex technological structures.  
- Lack accessibility to resources  
- Fairly capable of researching the competitive environment. | - Exhibit most closely to the entrepreneurial SME structure.  
- Fewer staff.  
- Fairly low levels of specialisations.  
- Fairly simple technological structure.  
- Higher levels of resource accessibility.  
- Lack capability in conducting competitive research. | - Strategic decisions – Objectives for these companies could be applied and customised according to their customers’ needs, and aims to establish their brand and reputation for good service. |
| - Not in favour of capabilities that support identification of CI needs.  
- Fairly in favour of functions that acquire competitive information.  
- Significantly low interest in managing the acquired information.  
- Disregard the analysis function.  
- Functions that help develop CI products are considered less useful.  
- Distributing the information is of fairly high importance. | - Fairly low interest in software functions that help acquire their CI needs.  
- Low value placed in the acquisition of competitive information  
- The organisation, storage, and retrieval of information variables did not receive a favorable response as an important software function.  
- Seek software support for analysing competitive information.  
- Seek software support to create CI reports.  
- Values software with capabilities to distribute CI. | - Early Warning – Possibilities for companies to become vulnerable to changes in related technologies.  
- Key players – Direct competitors and customers. |
### Mobile/wireless technology (23)

(continued from previous page)

- Larger numbers of employees.
- High levels of complexity for specialisation.
- Showed evidence of fairly complex technological structure.
- Complexity levels for resource accessibility were low.
- Showed positive associations with research capabilities.
- Mostly defines the *ad hoc* SME structure.

- Showed fairly high interest in software functions that help assemble their CI needs.
- High interest on acquiring and organising and managing information functions – the second and third phases.
- Fair level of concern for analysis support.
- Fairly high levels of importance placed on capabilities for producing and disseminating their CI – the fifth and sixth phase.

- Strategic decisions – Attention to be placed on the “race” in technology product releases and movements in services offered by service providers.
- Early Warning – New product or service launched by a larger firm that could threaten the smaller companies.
- Key players – The direct competitors, the vendors and manufacturers of mobile hardware and electronic products, and Telekom Malaysia.

### Shared services (29)

- Demonstrates mixed configuration in terms of structure.
- Predominantly companies with low numbers of employees.
- Employees with fairly specialised job scopes.
- Displayed complex technological structure.
- Showed lack of accessibility to resources.
- Low levels in research capability.

- Software configurations for this cluster would not include functions to highlight CI needs.
- Fairly low interest in software to support the acquisition, organisation, storage, and retrieval of competitive information – the second and third phases.
- Showed significant interest in the software for analysis.
- High regard was given for the development and distribution of CI products – the fifth and sixth phase.

- Strategic decisions – Aim to anticipate their clients’ needs and constantly improving their services in accordance to the related changes within the larger organisation.
- Early Warning – Being a separate company from the organisation that formed it makes it possible for the company to be vulnerable to other companies that are able to give similar but better services.
- Key players – The organisation that formed the companies in the cluster, and other shared services companies.

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**Table 6.6: Taxonomy of Competitive Intelligence Software Configurations for MSC-status SMEs in Malaysia’s ICT sector**
The first cluster in the taxonomy illustrated the CI configurations of companies in the software industry. Small and medium-sized enterprises in the software development division showed structural and contextual characteristics of the entrepreneurial-type company. This meant that most companies have a low number of staff who were not given specific job scopes, but instead, they were responsible for all aspects of the company. Ironically for companies that were heavily involved in technology development, these SMEs did not show evidence of a complex technological structure and access to technology support. However, their tendency for low accessibility to technology tools proved to be the result of low turnovers and lack of monetary access for most of the companies under this cluster. Nevertheless, the lack of financial resources did not stop these companies from undertaking in-depth research on their competitive environment. Possibly due to their high allocation for research, they placed fair to high values for all sections of the CI process to be integrated into their prospective CI software.

To help simulate the environment of these SMEs for software evaluation, an analysis of key intelligence topics representative of this cluster was undertaken. Software companies, generally aimed to expand their products and services into different areas, hence focused on improving revenues so as to satisfy the financial targets required to execute the expansion. In supporting their goals for improved financial stability, they focus on monitoring critical industry investments made by other companies so as to make proper decisions in current and future investments. In addition to monitoring investment transactions, they also centred on monitoring movements in trends of related technologies, as well as changes in perceptions of consumers on related products and services. Also, extra attention was given to key stakeholders in the industry, namely larger companies that potentially threatened the SMEs.

Similar to the software developers, the production and design cluster also depicted the characteristics of the entrepreneurial SME, which returned lower numbers in employees with undefined job scopes. Also the same as the previous cluster division, companies within this industry cluster lacked the proper technology tools to support their business. The majority of these companies also suffered from lack of monetary funds, which probably meant they were less capable of researching their competitive environments. The companies within this cluster were also less concerned with the first phase of the intelligence cycle — identifying CI needs. They did, however, have fair interests in the second and third phase — acquisition of information and organisation, storage, and retrieval. However, they proved to have a low impression for the analysis functions (fifth phase). Functions relating to the last two phases — the development and dissemination of CI reports — were also of fairly low concern, as the formation and
sharing the intelligence report did not seem to be a very high priority in their practice of competitive intelligence.

To give a more explicit view of the competitive environment of the production and design companies, the companies' strategy mostly involved in creating a unique image, as their asset was their ability to create a unique presence amongst their potential clients. Their early warning focus, which was to anticipate clients' preferences and changes in design trends were their greatest challenge. Key players focussed on were direct competitors, which included graphic design firms, postproduction houses, animation companies, and large companies that provided related products and services.

The telecommunications cluster had mixed characteristics of both the entrepreneurial and ad hoc types, with a larger number of employees, which mostly may had been divided into functional units, hence, the fairly high level of specialisation. Similar to the previous two clusters, this cluster did not show evidence of high technological structure nor accessibility to monetary resources; but just as the software companies, it was contrary to what was anticipated. Most of the companies within this sector placed high values on competitive research. As for the CI software configurations, this cluster showed fair interest in the application being able to support in identifying CI needs. Although it was assumed that the second and the third phase had positive associations, most companies in this cluster were not interested in software that did well in acquiring competitive information, but they were very interested in its capability to organise, store and retrieve the information. Like the production and design companies, there was less interest in software to support the analysis. Also, these companies showed low interest in having functions that develop and distribute competitive intelligence.

In understanding the environment, it was clear that small and medium-sized telecommunications companies had great concerns for pricing structures within the industry, because the existing competition seemed to be based on pricing packages offered. In addition, decisions within this group of companies were beginning to revolve around the assessment of competitors and customers about their approach to new up-and-coming technology and competitors: Internet-based telecommunications companies. Key players concentrated on were Telekom Malaysia, mobile and wireless service providers, and ISPs, where new technology-based services could ascend and pose critical threats.
Unlike any of the previous groups, the content development companies had the closest connection with the ad hoc SME. Like the telecommunications companies, the employee numbers were higher than others and were very specialised. Appropriately, they were inclined to support state of the art technology and were very financially stable. However, their high revenues were not allocated for researching the competitive environment. Nevertheless, it was still interesting to find, as anticipated, the positive connection between low responses to competitive research and their feedback on values placed on aspects of software. The companies from this sector did not value any part of the CI process integrated into software, except for the analysis function. Perhaps their approach to intelligence gathering had been efficient as a human function, but might still benefit from the analysis aspect of CI.

An overview of the competitive environment in the content development sector showed the need for companies to be flexible in their design approach, and to be innovative in the variation of their products. This was mainly due to the rapid advancements in applications that allow consumers to build content themselves, such as applications that directly support online editing, animation applications for web pages, publishing applications and web page-building software. Key players they focussed on were the SME competitors within the cluster, mainly large content firms and freelance web content developers.

The SMEs under the education and training sector mostly had low numbers of staff with limited specialisations. Most of the companies in this cluster seemed to be in the early stages of development, as their technological structure was fairly simple and they had a low turnover, most likely as a result of their lack of involvements in competitive research. These configurations mostly resembled the entrepreneurial SME structure. With insufficient revenues and low research capabilities, configurations for CI software for SMEs in this sector did not include an ability to identify CI needs, nor did they need functions that support acquisition, organisation, storage, and retrieval of competitive information. However, similar to the content developers, the companies showed more interest in the software for analysis. After analysing information using the application, they also expected to use the software for developing reports on their findings and to be able to disseminate the information. From this observation, it seemed to be quite suitable for companies to have a more manual approach towards the first three phases of the intelligence cycle, but needed automated support for analysis and developing and sharing the CI reports. Perhaps this might be a cost effective way of competitive analysis and research.
The education and training sector’s competitive environment called for companies within this cluster to strive for a certifiable reputation in their training and academic programmes, along with competitive pricing. Their recent unexpected event was the unveiling of a college branch at an international location by a prominent competitor, which was expected to set a pattern for other companies within the industry. Key concerns for stakeholders included the National Accreditation Board and the Ministry of Higher Education for changes in standards and regulations. Other key players include all the academic and training companies and institutes in the country.

The hardware and electronics design companies resembled the *ad hoc* SMEs, where the numbers in staff were the highest. However, they did not show any signs of specialisation and seemed to prefer more multitasking employees with less defined job scopes. The other variables continued to exhibit the *ad hoc* configurations, where these companies proved to have high accessibilities to technology support, high revenues, and hence fairly high involvements in competitive research. These companies mostly showed interest in software capabilities that help acquire competitive information, but exhibited less need for software that support identifying CI needs. With software support to acquire competitive information considered important, functions that organise, store, and retrieve that information would naturally be of importance. Functions that analyse were also held in fair regard by these companies. With that, this cluster also appreciated software that help develop CI products, as well as its dissemination capabilities.

There were varied concerns about the competitive environment of companies within the hardware and electronics design sector. The strategic decisions revolved around brand building, technological advances in design and manufacturing, suppliers, transportation logistics, and communications with stakeholders. These strategic approaches seemed very valid as they reflected future scenarios where companies created alliances with multinational companies, as well as taking into account the increasing interest for international-based companies to extend their product design divisions to Asian countries. Key players in the industry included clients and competitors, outsourcing companies, suppliers, and transportation companies.

The systems security companies, supported a partially *ad hoc* approach, although they had smaller number of employees, were fairly specialised. They also showed evidence of high technological support. Although SMEs under this cluster showed low revenues, they were fairly capable of researching the competitive environment. For the most part, their software preferences to support CI activities were
difficult to rationalise, as it was expressed that they were not in favour of capabilities that support identification of CI needs, although being fairly in favour of functions that acquired competitive information. Moreover, although acquiring information was considered important in software, the companies in this cluster showed significantly low interest in managing the acquired information. This cluster appropriately disregarded the analysis function. However, functions that helped develop CI products were considered less useful, while distributing the information was of fairly high importance.

A major concern for companies in the systems securities cluster in their competitive environment was the identification of trends that were moving towards strategic alliances, which in turn demanded strong brand presence. Companies within this sector had strived to be acquired by large multinational companies to be part of a comprehensive multi-service organisation. Focus was being placed on the competitors, the customers, and the larger firms, both as clients and partners.

Companies that offered systems integration products and services were mostly equivalent to entrepreneurial SMEs, with few but multitasking employees, supported a simple technological structure. However, although there were fewer employees, these companies mostly had high revenues. It was perceived that companies with high revenues may not necessarily have conducted competitive research. It may be assumed that there could have been allocations to outsource CI. Relatively, as it was assumed that their competitive information was gathered by another company, or perhaps, done manually, their software needs to support CI failed to include software functions that help acquire their CI needs. Similarly, the acquisition of competitive information, and the organisation, storage, and retrieval of information variables did not receive a favourable response. However, this group of companies sought software support for analysing competitive information and for creating CI reports, as well as capabilities to distribute them.

The concerns of systems integration companies about their competitive environment were their vulnerability to changes and advancements in related technologies. Key players were competitors and customers.

The mobile and wireless technology companies mostly consist of companies with many employees. As with most ad hoc-type SMEs, the employees may be assumed to had been divided into specialised groups. These companies were accustomed to state-of-the-art technology support. Strangely, the
Chapter 7
Evaluation of Competitive Intelligence Software
and Perceived Effectiveness

7.1 Introduction

Following the completion of stage one of the research project, the second stage of the research, which is reported in this chapter, aimed to examine the findings of Chapter 5 to be utilised in the development of a software evaluation framework based on the developed taxonomy.

This chapter of the dissertation is divided into four main sections. The first part of the chapter discusses the taxonomy of CI configurations in its entirety. The second section follows with descriptions of the conceptual framework for evaluating CI software. The third section discusses the findings of the evaluation analysis of CI software and online tools, followed by recommendations of suitable CI software packages for different configurations based on the taxonomy developed in stage one of the research. The fourth section concludes the chapter with a discussion on the findings of the study on perceived effectiveness of potential users of the software recommended.

7.2 Revisiting Previous Work on Competitive Intelligence Software Evaluation

Generally, it is agreed that there is a need to use a variety of innovative methodologies when evaluating software and retrieval systems\(^{271}\). However, this research project theorises that these methods are not helpful for evaluating commercial products for CI because the purpose and context of CI is not taken into account.

There have been a few schemes for evaluating the value of CI software. Possibly the most referred to of all CI software evaluation studies is the annually published Fuld & Company's Intelligence Software

According to the authors of the 2008-2009 Report, since it was already concluded that software could not address all the requisite functions for a full IC process, the study aimed to evaluate the products in relation to how the technology could reasonably support each step of the IC Cycle (Intelligence Cycle)\(^{272}\). Within a similar context, Chamberlain and Davies had also developed an equally comprehensive framework to evaluating IC software. Their framework for evaluation also used a rendition of the Intelligence Cycle as a basis towards building a simplified framework for identifying and evaluating where technology could have significant impact\(^{273}\). Building on this idea, the authors developed a basic categorisation of technology by classifying the products according to how many process steps the particular topic covered. As such, the products were classified on a scale from point solutions (products that only cover one phase of the Intelligence Cycle) to broad IC application suites. Each product was then analysed against a series of common criteria and functionalities divided according to the Intelligence Cycle. The product was to be evaluated according to section(s) of the outlined criteria, depending on the comprehensiveness of the software. According to Craig S. Fleisher, any solutions vendor will be able to demonstrate how their software meets the criteria they set out in their promotional materials, and that, usually, the criteria they fail to specify are often far more important than the criteria they include\(^{274}\). To help remedy this common shortcoming, the author organised the key criteria for evaluating IC software into the following categories: system usability, IC functionalities, financial and implementation considerations\(^{275}\). Just as the previously reviewed evaluation methods, this study also used the Intelligence Cycle as basis for evaluating software functions. According to Fleisher, no solution had yet provided full effectiveness and efficiency across all phases of the intelligence process, and many systems were designed expressly to be superior on one of the phases in particular, typically the data collection and dissemination phases. In 2004, Bouthillier and Shearer demonstrated an evaluation framework for IC software from an information science perspective\(^{276}\). The authors utilised a six-step intelligence cycle (discussed in Chapter 2 of this thesis), which is integrated to structure the evaluation process. The elements in the Intelligence Cycle were translated into criteria to develop a series of


\(^{275}\) Ibid.

evaluation questions, with particular emphasis on the value-added aspect. As with the criteria, the questions target a software application's to each step in the CI process. According to Bouthillier and Shearer, the criteria and questions here reflect the current state of technological development and seek to examine what can be done automatically by an application, or whether the application facilitates the task allowing for the user to do it manually.

In summary, the first three evaluation methods are similar in many aspects, and that the differences lie only in the level of detail and comprehensiveness in evaluating the software's functionality, usability, and supporting aspects. Bouthillier and Shearer's evaluation framework, however, is somewhat different as it is based on a re-developed version of the Intelligence Cycle that integrates information-processing elements – information production, seeking, retrieval, and use – which, according to Bates, make up the intellectual domain of information science. As stated in the previous chapter about Bouthillier and Shearer's well-received version of the Intelligence Cycle, this makes their evaluation framework the only one based on a process from the information discipline. However, so far, there still has not been an evaluation method for CI software tested within a more specific context, such as in the context of small and medium-sized enterprises, which would be an attribute of this research. As software for competitive intelligence come in a growing variety, with each is to suit different needs of different types of companies and users, it is quite appropriate to suggest that software evaluation methods should move to the next level where specific evaluation approaches are used by different segments in the CI market.

7.3 Software Evaluation and Analysis

Discussion of the findings is divided into three parts. The first part of this section discusses the software evaluation framework, followed by discussion on the selection of software and methodology used. The third part of this section discusses the findings of the CI software evaluation.

7.3.1 Conceptual Frameworks for Software Evaluation

Based on what was gathered in the first stage of the research, this section gives a preview of the 'ideal' competitive intelligence software for use within the boundaries of their respective environments and

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requirements. The following paragraphs give a general conceptual view on the ‘preferred’ features and functionalities of CI software for companies within each cluster. Each configuration was divided into two general sections – the intelligence cycle, which the phases conforms to the needs of each cluster - and other general criteria, which included supporting information for evaluation gathered from the questionnaire survey, technical and financial restrictions, and information and criteria for simulation based on their respective key intelligence needs.

7.3.1.1 Software Developers
Prospective users of CI software from the software developers’ cluster hold fairly high regard to software that supports in identifying their CI needs. Software functions that translate this aspect of the CI process relate to the comprehensiveness of the software’s analytical functions. In fact, most of these technologies prove to be useful for one or more phases in the CI process. Analytical tools within the software usually entail identifying specific information requirements and detail to augment the analysis function. This action prompts the user to identify pieces of information required to address CI topics. These pieces of information can be in a form of potential search terms to use in making queries. The application should help to define the terminology, a form of controlled vocabulary that can be utilised when searching information. Therefore, the associated technologies that support this phase in the intelligence cycle are text summarising, and text analysing and structuring technologies, which functions help pinpoint key concepts and extracts relevant sentences, resulting in a summary of a larger document.

Apart from functions that support identifying CI needs, users from this cluster also chose software functions that acquire, organise, store, and retrieve information as being of importance. These functions enable the software to identify external and internal information sources, monitor content within those sources, filtering of information, importing, screening and rating of information – for acquiring competitive information – and indexing, hierarchical and cross-topic linking, multi-format storing capabilities, storing capacity, searching and browsing capabilities – for organising, storing and retrieving of information. The associated technologies to acquire CI include profiling/push technology – software features that provide data or text automatically at regular intervals from multiple Internet or intranet sources, based on predetermined queries -, filtering technology – features that monitor Web sites, documents, and e-mail messages to filter information according to preferences, as well as highlight important parts, prioritise, delete and forward information automatically -, web searching – such as customised search engine technologies to launch queries automatically -, text mining – technology which
conducts higher-level text searching through linguistic patterning, and text analysing and structuring—which is a combination application that categorises and organises, as well as formatting.

For storing and retrieving information, content management technologies are expected, which encompasses several technology types into one application including storage of information in its original document format and capabilities of relational database, facilitating the identification of relevant information by searching a large volume of structured and unstructured information; and features that provide access to information sources based on subscription, such as Dialog and Factiva.

The users also value automation of the analysis, development and distribution aspects of the CI process within the CI software. However, since it has been established that the analysis phase of the CI process cannot be automated, selected technologies that augment the analysis function were considered for evaluation. To support analysis, the software should present a variety of CI analytical techniques, allow varying levels of analysis and able to synthesise information. The associated technologies include the same ones that support the other phases of the CI process, such as text summarising, text analysing and structuring, and analysing and reporting data technologies—those technologies which help extract data, search patterns to find meaning and usually allow various reporting options.

The development and distribution of CI products enable a variety of formats to be effectively viewed and properly disseminated through reporting technologies that can be found in groupware—technologies that encompasses a combination of messaging, calendaring, e-mail, workflow features—, multipurpose portals—technologies that integrate various technologies to provide access to internal and external sources, with groupware, automatic information retrieval, classification, and monitoring—and subscriptions of online information services.

Apart from studying the functionalities of the ‘ideal’ software, other factors were also included in the evaluation. These factors cover the users’ technical and financial boundaries, and key intelligence needs, which were used to make assumptions in simulating the information searching and management situations within each SME cluster. Although the software developers were assumed to be very technically oriented, the data gathered to outline their technical margins show that majority of the companies (63%) within this cluster are not connected to an in-house or online server, which is a major requirement for some CI software. This requirement allows accessibility for all users from one centralised location. However, these
companies not connected to a server can only choose standalone CI applications, which can be accessed and used without having to run a server. The remaining technical requirements include operating systems, processing speed, and random access memory requirements, which 96% of all respondents from this cluster equally qualified. As for their financial circumstances, 71% of SMEs within the software developers' cluster are concerned with the price of the application, and 66% of the respondents were not ready to make any financial allocations for software to support CI. Their key intelligence needs gathered from the first stage of the research showed that the information to be integrated, stored, organised, and retrieved in terms of CI is related to areas of expansion, industry investments, changes in customer perceptions, and the monitoring of larger firms and multinational companies that may pose threats. For the evaluation, these topics were used to translate and fulfil the software's information requirements, such as customising the fields and taxonomy; to test the storage and retrieval functions, such as in developing related search strategies, and other acquiring and organising techniques; and to test the reporting aspects of the software. Figure 7.1 shows the overall conceptual framework for software evaluation for the software developers' cluster.
Figure 7.1 Evaluation criteria for software developers' cluster

CI process criteria (required functions and features in the software)
- Text summarising
- Text analysing and structuring

Acquisition of competitive information
- Profiling/push technology
- Filtering/intelligent agents
- Web searching
- Information services

Organisation, storage and retrieval
- Content management
- Text discovering
- Groupware
- Multipurpose portals
- Text analysing and structuring

CI software criteria for software developers

Systems criteria
- Majority were server enabled (63%)
- 96% use Windows-based operating system, have sufficient processing speed, and RAM

Subject concerns include areas of expansion, industry investments.

Simulation criteria
- Monitors changes in customer perceptions, and activities of larger firms and competitors

Financial criteria
- Majority have high concerns on price (71%) and are not ready to pay anything for CI software (66%).

Distribution of CI products
- Groupware
- Multipurpose portals
- Information services
7.3.1.2 Production and Design

Unlike the software developers, prospective users of CI software within the production and design cluster only require functions that support the second and the third phases of the intelligence cycle to be automated, as these phases have been considered the most tedious aspects of the CI process. As previously stated, the functions within the second phase involve the software's abilities to identify information sources and specific topics, monitor the content of the sources, filtering and alerting of information, importing, screening and rating of information. As illustrated in Figure 7.2, the technologies associated with the acquisition of competitive information are profiling and push technologies, filtering and intelligent agents technologies, and web searching and accessibility options to subscribed information services. The functions within the organising, storing and retrieving of information phase involve indexing of information, hierarchical and cross-topic linking, storage capabilities, searching and browsing. Technologies associated with this third phase include document and content management utilities, text discovering, groupware, multipurpose portals, and text analysing and structuring capabilities.

In terms of systems criteria, only 14 (45%) of the 31 respondents within this cluster had been working in a company that utilised a network using a server, which allowed the employees to access the company intranet and applications at a central location. This technological feature within the companies would also enable them to use any of the more comprehensive server-based CI software. The remaining 17 companies within this cluster, which is the majority, would be limited to the standalone software and online services. Out of the 31 respondents, 24 admitted to using Windows-based operating systems, 23 with a minimum Intel Pentium processor, and 25 with at least a 64 mega-byte RAM.

In preparing a simulation for evaluation, the key intelligence topics gathered from the first stage of the research showed that prospective users would use the CI software to monitor the environment in making sure their product maintains their uniqueness in approach and design. The focus would also be on factors that influenced in the changes in client preference, whether trends in design or changes in company image and objectives. Monitoring and gathering the appropriate intelligence about these changes helps decision-makers anticipate the changing preferences in customers. Other criteria that were gathered from the survey are the high concerns on the price of software and the related level of usage. It was also indicated that 36% of the respondents had no plans for allocating funds for implementing CI software; 30% would pay between RM100 and RM1000, and 30% would pay no more than RM5000.
Figure 7.2 Evaluation criteria for production and design cluster

CI process criteria (required functions and features in the software)
- Acquisition of competitive information
  - profiling/push technology
  - filtering/intelligent agents
  - web searching
  - information services

Organisation, storage and retrieval
- content management
- text discovering
- groupware
- multipurpose portals
- text analysing and structuring

55% server enabled

Systems criteria
Majority use Windows-based operating system, have sufficient processing speed, and RAM

Simulation criteria
Monitors environment to make sure product is unique in approach and design by monitoring competitors

Anticipate changing preferences of clients and factors that influence the changes

Other criteria
High concerns on price (55%) and the prospective level of usage (61%)

36% - no allocation for CI software
30% - would pay between RM100 to RM1000
30% - would pay no more than RM5000
7.3.1.3 Content Development

The correlations discussed in the previous chapter showed that the companies from the content development sector were only interested in the capabilities of software to support their analysis activities. It can only be assumed that their approach to CI requires manual efficiency in other aspects of the intelligence cycle, except for analysis, which requires functions that include various CI analytical techniques, level(s) of analysis, information synthesising, and whether or not the analysis functions bring about a range of possible actions or decisions. These functions should be best supported by related technologies, such as text summarising, text analysing and structuring, pattern analysis and reporting, and services offered by online information services and vendors, as shown in Figure 7.3 below.

The systems criteria gathered from the questionnaire showed only 14 (58%) of the 24 respondents within the content development sector had been working in companies with central servers, which allowed for server-based applications. The remaining 10 companies within this cluster would be limited to only the standalone software and online services. Out of the 24 respondents, 23 disclosed using Windows-based operating systems, a minimum Intel Pentium II processor, and all respondents had at least a 64 mega-byte of RAM.

In adding the simulation element to the evaluation of CI software, the key intelligence topics showed that prospective users from this cluster would use the CI software to monitor the environment in areas of online editing, advancements in animation application for web page building, and also, publishing software. Focused subjects would include direct competitors, larger content related firms, and freelance content builders.

Other criteria that were gathered from the survey were high concerns with the price of software (72%), the level of usage (50%), and training in using the software (41%). Moderate concerns taken into account were security aspects of the software (33% of the respondents) and maintenance (29%). It was also indicated that 26% of the respondents would pay between RM100 and RM1000, and 21% would between RM10000 and RM20000 for CI software.
Figure 7.3 Evaluation criteria for content development cluster

CI process criteria (required functions and features in the software)
- Analysis
  - Text summarising
  - Text analysing and structuring
  - Analysing and reporting data

CI software criteria for content development
- Systems criteria
  - 58% server enabled
    - Majority use Windows-based operating system, have sufficient processing speed, and RAM
    - Monitor advancements in online editing, animation apps for web page building, publishing apps.

  - Simulation criteria
    - Subjects include direct competitors, large content firms, and freelancers.
    - High concerns on price (72%), the prospective level of usage (50%) and training (41%). Moderate concerns for security (33%) and maintenance (29%).

  - Other criteria
    - 26% would below RM1000 for CI software and 21% would only spend between RM10000 and RM20000.
7.3.1.4 Telecommunications

The respondents from the production and design cluster were sensible in choosing software functionalities that support the acquisition and organising, storing, and retrieving of competitive information, because many practitioners agree that the main purpose for CI software is essentially to support the information management aspect of the CI process, which the second and third phase of the intelligence cycle cover. However, the prospective users of CI software within the telecommunications sector had an interesting approach to their needs and preferences to CI software support; they showed low complexity levels for functions that support acquire competitive information, but high interests in organising, storing, and retrieving CI. It can be assumed, however, that their methods of acquiring information may not be Internet-based but rather a more ‘hands-on’ approach, where gathering primary information may be the main objective. The functions related to this aspect of the CI process include indexing capabilities, cross-linking and hierarchy, multiple-format storing, and searching and browsing capabilities. Related technologies are document and content management programmes, text discovering, groupware, multipurpose portals, and text analysing and structuring.

For implementing the CI software, it was indicated that 50% of the respondents representing telecommunications companies used application servers which house programmes shared across their network of multiple users. These servers could also house CI applications which required a server to be integrated into the system structure. Additionally, 94% of the respondents use later versions of Windows operating system, sufficient processors and RAM.

In evaluating software, there need to be criteria for simulating information searching and management approaches of potential CI software users. Here, users were likely to use the storage and retrieval function to monitor price changes within the competitors’ websites. Also, there were concerns about new Internet-based telecommunications to be considered when executing the simulation. Subjects of focus include Telekom Malaysia, mobile and service providers, and ISPs.

The survey was able to extract frequencies on the cluster’s general financial situation. The frequencies showed that 72% of the respondents were highly concerned with the price of software, followed by related level of use (50%) and its applicability to the company’s structure. 44% stated that there would not be any spending for CI software, and 27% would spend no more than RM1000. These criteria are illustrated in Figure 7.4.
Figure 7.4 Evaluation criteria for telecommunications cluster

CI process criteria (required functions and features in the software)
- Organisation, storage and retrieval
  - content management
  - text discovering
  - groupware
  - multipurpose portals
  - text analysing and structuring

CI software criteria for telecommunications

Systems criteria
- 50% server enabled
  - 94% use Windows-based operating system, have sufficient processing speed, and RAM
  - Monitors pricing and new Internet-based telecommunications technology

Simulation criteria
- Subjects included Telekom Malaysia, mobile and wireless service providers, and ISPs

Other criteria
- High concerns on price (72%), the prospective level of usage (50%) and applicability to structure (33%)
- 44% would not spend anything for CI software and 27% would only spend below RM1000.
7.3.1.5 Education and Training

SMEs in the education and training line found software functions that relate to the analysis of competitive information, development of CI products and distribution of CI products to be of significant importance. The analysis phase in the CI process considers functions that lead to various CI analytical techniques, level(s) of analysis, information synthesising, and decisions and actions. The fifth phases often involve the need for software to have a variety of formats for effective viewing, as well as its ability to be compatible for adaptability. The technologies to develop CI products are text summarising, text analysing and structuring capabilities, and reporting applications. The last phase identifies the disseminating function, which involve the sharing and distributing of intelligence that can be found in groupware, multipurpose portals, and information services.

The systems criteria gathered from the questionnaire showed only 8 (40%) of the 20 respondents within the education and training sector had been accessing their information and running software programmes through central servers, which are minimum requirement for some more comprehensive CI applications. The remaining twelve would only be capable of installing standalone applications for CI. All of the companies which responded used a Windows-based operating system, with sufficient processors and RAM.

As for the criteria for simulation, the environment of SMEs within this cluster revolved around decisions about marketing the training and academic programmes, and enhancing their standards and certifiable as reputable higher education and professional training institutes. These strategic decisions would be supported by monitoring changes in national accreditation standards, the Ministry of Higher Education and standards placed by other colleges.

Other criteria that were considered for evaluation included high concerns for price (45%) and level of usage (50%) and moderate concerns for the software’s credibility (25%) and applicability to company structure and context (25%). The concern for prices was such that 25% of the respondents from this sector were not willing to spend at all for CI software, 35% would pay between RM1000 and RM5000, and only 15% were ready to allocate more than RM50,000. Figure 7.5 gives an illustrated overview.
Figure 7.5 Evaluation criteria for education and training cluster

CI process criteria (required functions and features in the software)

- Analysis
  - Text summarising
  - Text analysing and structuring
  - Analysing and reporting data

Development of CI products
- Text summarising
- Text analysing and structuring
- Information services and vendors

Distribution of CI products
- Groupware
- Multipurpose portals
- Information services

CI software criteria for education & training

Systems criteria

- 60% not connected to any server
- 40% server enabled

- 100% use Windows-based operating system, have sufficient processing speed, and RAM

Simulation criteria

- Concerns marketing training and academic programs, and develop reputation and standards

- Monitors changes in accreditation standards, the Ministry of Higher Education and colleges.

Other criteria

- 25% would not pay for CI software
- 35% would pay RM1000 to RM5000
- 15% would pay more than RM5000

- High concerns on price (45%) and level of usage (50%). Moderate concerns for software's credibility (25%), and applicability to company structure and context (25%).
7.3.1.6 Hardware/electronic Design

The respondents of the hardware and electronics design sector placed high value for all the phases of the intelligence cycle to be included in their ideal version of CI software, except for the aspect of identifying CI needs, which was very understandable as there are not any real technologies to automate this step in the CI process. Additionally, to identify CI needs for a particular programme, many practitioners agree that it is mainly a human process, where it often involves planning and strategising that cannot be automated. Therefore, as illustrated in Figure 7.6, the technologies to look for in evaluating CI software for these companies are profiling/push technologies, filtering/intelligent agents, and web searching capabilities for the acquiring phase; content management capabilities, text discovering, groupware, and text analysing for the organising, storing and retrieving phase; text summarising, text analysing, and reporting capabilities for the analysis phase, text summarising and analysing, reporting capabilities, groupware, and multipurpose portals for the development and distribution phase.

In this cluster, 11 (58%) of the 19 responding companies were connected to a central server, but all of the respondents qualified in the other technical criteria with later versions of a Windows operating system, up-to-date processors, and sufficient random access memory.

The environmental concerns were on brand and image building, technological advances in design and manufacturing, suppliers and transportation logistics. This sector also value close communications with key stakeholders in the industry with the objective of strategic alliances with multinationals. It can be assumed that proper intelligence on these key players would be highly valued.

In terms of financial situations, there was a range of different responses. 36% of the companies were not willing to allocate any funds for software to support CI, 26% would pay between RM1000 and RM5000, 10% would spend between RM5000 and RM10000, and 10% would allocate more than RM50,000.
Figure 7.6 Evaluation criteria for hardware/electronics design cluster

CI process criteria (required functions and features in the software)

- Acquisition of competitive information
  - profiling/push technology
  - filtering/intelligent agents
  - web searching
  - information services

CI software criteria for hardware/electronics design

Systems criteria

- Analysis
  - Text summarising
  - Text analysing and structuring
  - Analysing and reporting data

- Development of CI products
  - text summarising
  - text analysing and structuring
  - information services and vendors

Majority server enabled (58%)

- 100% use Windows-based operating system, have sufficient processing speed, and RAM

Simulation criteria

- Concerns brand building, advances in design and manufacturing, suppliers and transportation

- Improved liaises with stakeholders. Interest in possible alliances with multinationals.

Financial criteria

- Majority have high concerns on price (57%) and level of usage (52%)

- 36% were not ready to allocate funds for CI software.
  25% would pay RM1000 to RM5000.
  10% would pay RM3000 to RM10000
  10% would pay more than RM50000

Organisation, storage and retrieval
- content management
- text discovering
- groupware
- multipurpose portals
- text analysing and structuring

Distribution of CI products
- groupware
- multipurpose portals
- information services
Potential CI software users working in companies within the systems securities sector seem to have a 'search and disseminate' approach to competitive intelligence. Amongst many assumptions that can be made about approaches to CI, this assumption was based on the preferred technologies to be included in their 'ideal' CI software, which were the acquisition of competitive information phase - second phase in the CI process - and the distribution of CI products phase - sixth phase in the CI process. The functions within the second phase involve the software's abilities to identify information sources and specific topics, monitor the content of the sources, filtering and alerting of information, importing, screening and rating of information. As illustrated in Figure 7.7, the technologies associated with the acquisition of competitive information are profiling and push technologies, filtering and intelligent agents technologies, web searching and accessibility options to subscribed information services. The functions that support the distribution of CI products involve the application's capacity for distributing CI products. The capacity for distribution refers to technologies such as groupware, multipurpose portals and access to subscribed online information services.

Although there were only 7 respondents from this sector that answered the questionnaire survey question about systems requirements, the majority (5) were server enabled, which would allow for the integration of most any server-based or standalone applications. In addition, all 7 companies used computers with later versions of Windows operating system, with at least Intel Pentium II processors 64 mega-byte RAM.

Key intelligence topics simulate the environment of systems securities companies with their concern for brand development. Their strategic decisions may influence the use of software to organise information in preparation for strategic alliances and joint ventures towards a multi-service organisation.

Other criteria take into consideration the high concerns with price and security. Additional concerns were the maintenance aspects of running CI software, level of usage, and expertise. Out of the 7 respondents, three of them expressed their capacities to allocate RM5000 to implement CI software, and two would pay between RM100 and RM1000.
Figure 7.7 Evaluation criteria for systems security cluster

CI process criteria (required functions and features in the software)

- Acquisition of competitive information
  - profiling/push technology
  - filtering/intelligent agents
  - web searching
  - information services

- Distribution of CI products
  - groupware
  - multipurpose portals
  - information services

CI software criteria for systems security

Systems criteria

- 71% server enabled

- 100% use Windows-based operating system, have sufficient processing speed, and RAM

Simulation criteria

- Topics concern brand development and possible strategic alliances

- Looking for possibilities to be bought over to be part of multi service organisation

Other criteria

- High concerns on price (57%), and security (42%). Moderate concerns on maintenance, level of usage, and expertise (28% respectively)

- 14% - no allocation for CI software
- 28% - would pay between RM100 to RM1000
- 42% - would pay no more than RM5000
7.3.1.8 Systems Integration

SMEs in the systems integration industry valued software that has functions for analysing competitive information on the development and distribution of CI products. The analysis phase in the CI process considers functions which enable a range of analytical techniques, information synthesising and analysis, and decisions and actions. The fifth phase involves the software having a variety of formats for effective viewing, as well as an ability to be adaptable to other formats. The technologies to develop CI products are text summarising, text analysing and structuring capabilities, and reporting applications. The last phase involves the sharing and distributing of intelligence that can be found in groupware, multipurpose portals, and information services.

The systems criteria gathered from the questionnaire showed 17 (94%) of the 18 respondents within the education and training sector had been accessing their information and running software programmes through central servers, a minimum requirement for some CI applications. Only one company within this cluster would be limited only to standalone applications for CI.

As for the criteria for simulation, the environment of SMEs within this cluster revolved around decisions about branding and enhanced reputations. Other focuses included monitoring changes in related technologies and competitors.

Other criteria that were considered for evaluation included high concerns for price (55%) and level of usage (55%) and moderate concerns for the training (33%), maintenance (27%) and applicability to company structure and context (25%). Although these companies had concerns for prices of software, they were far more willing to pay for CI software in comparison to most companies from other clusters, as 33% of the respondents would pay between RM5000 and RM10000, 16% would pay between RM30,000 and RM50,000, however, 33% were ready to allocate more than RM50,000.
Figure 7.8 Evaluation criteria for systems integration cluster

CI process criteria (required functions and features in the software)

- Analysis
  - Text summarising
  - Text analysing and structuring
  - Analysing and reporting data

Development of CI products
- Text summarising
- Text analysing and structuring
- Information services and vendors

Distribution of CI products
- Groupware
- Multipurpose portals
- Information services

CI software criteria for systems integration

Majority server enabled (94%)

100% use Windows-based operating system, have sufficient processing speed, and RAM

Systems criteria

Aims to establish brand and reputation.

Simulation criteria

Monitors changes in related technologies, and competitors

33% would pay above RM50,000 for CI software. 16% would pay RM30,000 to RM50,000. 22% would pay RM5,000 to RM10,000.

Other criteria

High concerns on price (55%) and level of usage (55%). Moderate concerns for training (33%), maintenance (27%), and applicability to company structure and text (38%).
7.3.1.9 Mobile/Wireless Technologies

As shown in Figure 7.9, prospective users of CI software from the mobile and wireless cluster consider software that supports identification of their CI needs in fairly high regard. The associated technologies that support this phase in the intelligence cycle are text summarising, and text analysing and structuring technologies, functions which help pinpoint key concepts and extracts relevant sentences, resulting in a summary of a larger document. Users from this cluster also chose software functions that acquire, organise, store, and retrieve information to be of importance. These functions enable the software to identify external and internal information sources, monitor content within those sources, filtering of information, importing, screening and rating of information – for acquiring competitive information – and indexing, hierarchical and cross-topic linking, multi-format storing capabilities, storing capacity, searching and browsing capabilities – for organising, storing and retrieving of information. The associated technologies to acquire CI include profiling/push technology, filtering technology, web searching, and text mining. For storing and retrieving information, content management technologies were expected, as well as features that provide access to subscription-based information sources. The users also valued automation of the analysis, development and distribution aspects of the CI process within the CI software. To support analysis, the software should present a variety of CI analytical techniques, allow varying levels of analysis and be able to synthesise information. The associated technologies also include text summarising, text analysing and structuring, and analysing and reporting data technologies. The development and distribution of CI products enable a variety of formats to be effectively viewed and properly disseminated through reporting technologies that can be found in groupware, multipurpose portals, and subscriptions of online information services.

In this cluster, only 9 (39%) of the 23 responding companies were connected to a central server, but majority of the respondents qualified in the other technical criteria with later versions of Windows operating system, up-to-date processors, and sufficient random access memory. As for the criteria for simulation, the environment of SMEs within this cluster revolved around decisions that may require prospective users of CI software to monitor movements in technology product releases and changes in services. Other focuses included topics related to competitors, manufacturers of mobile hardware and related electronic products. Other concerns take into consideration the high concerns on price (82%), maintenance (30%), and level of usage (34%). The concern for price was demonstrated by 45% of the respondents not being willing to allocate funds for CI software, and 36% being willing to pay between RM100 and RM1000.
Figure 7.9 Evaluation criteria for mobile/wireless technology cluster

**CI software criteria for mobile/wireless technology**

**CI process criteria** (required functions and features in the software)
- Analysis
  - Text summarising
  - Text analysing and structuring
  - Analysing and reporting data

**Systems criteria**
- 57% not connected to any server
- 39% server enabled
  - Majority use Windows-based operating system, have sufficient processing speed, and RAM
  - Monitor rapid movement in technology product releases and changes in services in the competitive environment

**Simulation criteria**
- Focus on topics related to competitors, manufacturers of mobile hardware and related electronics products.

**Financial criteria**
- Majority have high concerns on price (82%) maintenance (30%) and level of usage (34%).
- 45% were not ready to allocate funds for CI software and 36% would pay no more than RM1000.

**Acquisition of competitive information**
- Profiling/push technology
- Filtering/intelligent agents
- Web searching
- Information services

**Development of CI products**
- Text summarising
- Text analysing and structuring
- Information services and vendors

**Distribution of CI products**
- Groupware
- Multipurpose portals
- Information services

**Organization, storage and retrieval**
- Content management
- Text discovering
- Groupware
- Multipurpose portals
- Text analysing and structuring
7.3.1.10 Shared Services

SMEs in the shared services industry valued software that had functions that analyse competitive information, development and distribution of CI products. The analysis phase in the CI process considers functions that enable a range of analytical techniques, information synthesising and analysis, and decisions and actions. The fifth phases involve the software to have a variety of formats for effective viewing, as well as its ability to be adaptable to different to other formats. The technologies to develop CI products are text summarising, text analysing and structuring capabilities, and reporting applications. The last phase involves the sharing and distributing of intelligence that can be found in groupware, multipurpose portals, and information services.

In this cluster, only 13 (39%) of the 28 responding companies were connected to a central server, but majority of the respondents qualified in the other technical criteria with later versions of a Windows operating system, up-to-date processors, and sufficient random access memory.

To create the competitive environment from the point of view of a CI software user, there should be constant monitoring of changes in structure and context of the parent company of the shared services. In addition, an awareness of other firms offering similar services was necessary, as they might pose various threats.

Other concerns to be taken into consideration included the high concerns on price (64%) and level of usage (53%). Moderate concerns were for technology requirements (35%) and applicability to company structure and context (25%). Also, a concern for price was expressed by 17% of the respondents who were not willing to allocate funds for CI software; 14% would spend below RM1000 and 39% would pay between RM1000 and RM5000. Figure 7.10 shows an overview of these criteria.
Figure 7.10 Evaluation criteria for shared services cluster

CI process criteria (required functions and features in the software)

- Analysis
  - Text summarising
  - Text analysing and structuring
  - Analysing and reporting data

- Development of CI products
  - Test summarising
  - Text analysing and structuring
  - Information services and vendors

CI software criteria for shared services

- Systems criteria
  - 54% not connected to any server
  - 46% server enabled
  - Majority use Windows-based operating system, have sufficient processing speed, and RAM
  - Aware of other firms that offer similar services
  - Monitors changes in structure and context of parent company to anticipate changes in needs

- Simulation criteria
  - 39% would pay between RM1000 and RM5000 for CI software. 17% were not ready to pay anything. 14% would pay below RM1000.

- Other criteria
  - High concerns on price (64%) and level of usage (53%). Moderate concerns for technology requirements (35%) and applicability to company structure and text (25%).
The evaluation criteria for the ten clusters gave a detailed overview of the variables individually constructed based on the taxonomy of configurations (Table 6.6). These individual models of evaluation criteria were used to evaluate the selected software during the second stage of the research. Based on these evaluation criteria, the following sections discussed the methodology, followed by the findings based on the ten sets of criteria outlined above.

7.3.2 Software Selection and Methodology

The sample of software to be evaluated during this stage of the analysis was selected in the following way. In identifying CI software, it can be said that many software packages that promote themselves as business intelligence applications did not have any resemblance to the CI concept and process. Rather, they were either tools used for number crunching, data warehousing, quantitative analysis, and the integration of internal information management. Once these packages were filtered, the list of software that qualified as CI software, based on the research's set requirements, were further filtered according to general technological boundaries of SMEs. These boundaries were largely based on the general assumption that SMEs generally suffer from lack of funds, which in turn causes the inaccessibility of a range of technological requirements. However, during the midst of selecting the list of software, it was found that many CI software developers were moving their software packages from standalone to on-line, partly due to some companies not having access to servers, which have been a major requirement for most enterprise software. Online-based software allows for users to access the vendors' servers via online, thus not requiring the purchase of in-house servers. Thus, the research strategy of evaluation CI software had to include online tools, which was also bounded by the same set requirements. In identifying the capabilities of the selected software and online tools in terms of the intelligence cycle, it was concluded by observation that CI software, although some had promoted themselves as fulfilling all aspects of the CI process, were varied in the value they add to the phases of the intelligence cycle.

Although the types of software to be included in the preliminary assessment had been decided, the next step was to gain access to full-featured versions of the software to be fully evaluated. The opportunity to meet with CI software vendors came during the SCIP 2007 Conference at Orlando, Florida, USA. Many representatives were approached, but most were hesitant to participate in the study. However, representatives of three CI-ready software – Strategy, Wincite and Traction – agreed to give a full demonstration. All three companies also eventually provided access to their products to be evaluated.
Many low-cost software were also considered and three were chosen and purchased for evaluation - Copernic, Botbox, and Brimstone. The last category was online services and tools, and LexisNexis and Factiva were selected as the tools to be evaluated since they were accessible through the Department of Information Science and Loughborough University Library’s subscriptions. These online CI tools were chosen for their range of capabilities of supporting the acquisition, organisation, storage and retrieval and analysis phases of the intelligence cycle.

<table>
<thead>
<tr>
<th>Types of Tools</th>
<th>Company</th>
<th>Product Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI ready software</td>
<td>Strategy!</td>
<td>Strategy 3.1</td>
</tr>
<tr>
<td></td>
<td>Wincite</td>
<td>Wincite 7.4</td>
</tr>
<tr>
<td></td>
<td>Traction</td>
<td>Traction 3.7</td>
</tr>
<tr>
<td>Standalone software (Low cost tools)</td>
<td>Copernic</td>
<td>Copernic Pro</td>
</tr>
<tr>
<td></td>
<td>Botbox AB</td>
<td>Botbox</td>
</tr>
<tr>
<td></td>
<td>Brimstone AB</td>
<td>Brimstone v. 2</td>
</tr>
<tr>
<td>Online information services/tools</td>
<td>Factiva</td>
<td>Factiva.com</td>
</tr>
<tr>
<td></td>
<td>LexisNexis</td>
<td>LexisNexis</td>
</tr>
</tbody>
</table>

Table 7.1 List of CI software for evaluation.

Table 7.1 above lists the CI software that was chosen for evaluation. A general characteristic of SMEs is that they are extremely varied in their approaches to business. For this reason, the addition of online information services adds diversity in the types of software tools to compensate for the diversity in SMEs. It is important to note that although there have been a number of evaluation and review studies on CI software, however, this research was the first to insist on full versions of the software rather than demonstration versions, which are often limited in functions and features.

The analysis in this part of the research evaluated the listed software based on the needs and requirements on the ten clusters of small and medium-sized enterprises, which fulfilled the fourth objective of Aim 2 in

the research. This approach was itself a unique contribution as other studies of software for CI evaluated the level of automation provided by the application to the intelligence cycle. In other words, the scores given for the evaluated software reflected how comprehensively the product assisted in every phase of the CI process, which this research has established to be ineffective because the context of CI practice was not taken into account on those previous studies. Although studying the various technical features of CI software is important, and not ignored in this study, if however these features are not assessed in the light of the value they add to a particular approach to CI, the assessment will not help users to determine whether a software application is useful for their CI function. This research improved the evaluation process of CI software in this aspect.

Based on the developed taxonomy of intelligence configurations described in Chapter 6, the research derived ten sets of conceptual frameworks for CI software evaluation, which are illustrated in Figures 7.1 – 7.10. These sets illustrated the needs of each SME cluster in terms of the values placed on the phases of the intelligence cycle, the technical features and functions, systems criteria, environmental criteria for simulation, and other criteria, which covered various concerns acknowledged during the survey studies. These conceptual evaluation frameworks were converted into unique sets of criteria for the CI product's fitness based on its purpose and on the particular needs of the consumers under study. The unique sets of criteria were then employed in the evaluation of the eight selected software tools with the purpose of finding the most suited software tool for each SME cluster. These sets of evaluation criteria informed the evaluation process and its outcomes are discussed in the following section. (The ten sets of criteria for evaluating CI software are listed in Appendix 2, A2.1 –A2.10)

7.3.3 Analysis of Findings – Comparison of CI Software Tools to Cluster Profile

This section discussed the outcomes of the evaluations of eight CI software and online tools using the sets of evaluation criteria. Discussion of the findings in this section will treat each of the software identified in turn. Each case provided detailed descriptions of the findings for intelligence cycle needs, technical features and functions, systems criteria, environmental criteria for simulation, and financial and other miscellaneous criteria.
Strategy 4.0

Strategy! Software version 4.0, an application specifically intended to support CI, was designed to organise competitive information from various sources and produce a range of reports that contribute to analysis, and sharing. The main capability of this application was to store and retrieve reports, providing users with options for comparing companies, products and other parameters. The evaluation began with a rundown of all functionalities and features, and requirements of the software.

To go down the phases of the intelligence cycle, the application augmented the first phase – identifying CI needs – by providing a field to support tracking of questions for key intelligence needs. Here, users were able to input the KIT questions and topics into the system, and then use information collected and organised in the database to track and resolve the KIT questions, thereby fulfilling the objectives and identifying CI needs. This feature also prompted users to identify further topics that may need attending to. The fields for CI topics were goals, capabilities, strategy, assumptions, response profile for competitors, threat of substitution for substitute product services, entry barriers for potential entrants, and bargaining power for customers and suppliers, which, comparatively with other applications in this study, is considered quite comprehensive. As for the second and third phases – acquisition of competitive information; and organisation, storage and retrieval – the application works with another supporting application called IntoAction 4.0, which provided newsfeeds and published information that could be managed with an integrated news management function. This function allocated news that was considered high priority by having an advanced section, which allowed users to input specific details to manage the retrieved information. IntoAction also used search agents to source the external information. This version of Strategy! had an index and search function to locate relevant documents stored in internal network files and from within its database, which is an online server accessible by registered users to store and manage information. This aspect of the software was also customisable for relevance, where the default categories and fields could be changed in accordance to specific search needs. The default categories and fields were also useful to start and support less experienced users to determine the types of information to be collected for analysis. Strategy! could benefit users in managing gathered information in terms of storage and retrieval, but the information kept in the database still need to be manually reviewed to ensure it is not outdated, which could be a problem as gathered information could easily add up and there was no way to alert users of obsolescence. Another drawback was that the application did not allow the monitoring and alerting of changes within the sources. However, this drawback could be augmented by purchasing access...
to a product called Newsroom, which automated the monitoring of customer Web sites, news groups, weblogs, job postings, investor pages, news wires and competitors' local newspapers. Web pages could be converted into a monitored source and could be filtered and included into newsletters and alerts. Another feature of Strategy! was the primary information collection capabilities, which involved a telephone service provided and managed by the Strategy! CI Team. The InTouch Competitor Hotline was a service that allowed users to phone in to record tacit knowledge onto a voicemail message or fax and could then be converted into an email attachment to be reviewed for its contents and value. The information collected could then be incorporated into the database and could be accessed by users via the reporting function. Users could also submit feedback, comments and additional information. This service separated the software from the other software in this evaluation study as it significantly reduced the delay between getting relevant competitive information and turning it into actionable intelligence for decision-making. Most CI practitioners would agree that this was a key aspect in staying ahead in businesses of all types.

Although it had been established that the user did the real analysis of the collected information, not the software, Strategy! supported the fourth phase of the intelligence cycle through its abilities to generate various charts and graphs to make comparisons with regard to any user-defined field or category. Other technology features that were usually associated with supporting analysis, such as text summarising and pattern analysis, were not present. It could be stated that the designers for this software did not stress on a complex analysis system. The last two phases – the development and distribution of CI products – entails the structuring and delivery of analysed competitive information, which offered over 150 reporting templates. The main feature was that reports could be in many different formats, such as HTML, rtf, MSWord, Excel, PDF, and Lotus Notes compatible files. The reports could be stored, retrieved and posted through IntoAction.

To implement Strategy!, it was necessary for users to use at least Windows 95, with a Pentium 100Mhz processor and 24 megabyte of RAM or more. As of November 2006, prices start at $7500 for Strategy! and $11,800 for IntoAction, available for both individual and enterprise. To add Newsroom, it is starts at an additional $22,000 per year. Although it was not required for users to purchase Newsroom and IntoAction, Strategy! was virtually useless without them, unless the user was extremely efficient in retrieving and managing relevant information from over 100 sources. The following table detailed the findings of the evaluation studies based on the frameworks of each industry cluster.
<table>
<thead>
<tr>
<th>CI Process</th>
<th>Software developers</th>
<th>Production &amp; design</th>
<th>Telecommunications</th>
<th>Content development</th>
<th>Education &amp; training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying CI needs: provides database to resolve KIT questions, offers many CI topic fields and prompts users to other CI areas.</td>
<td>Does not suit staff’s skill sets: not fairly intuitive, difficult to use and requires some training.</td>
<td>Does not suit staff’s skill sets: not fairly intuitive, difficult to use and requires some training.</td>
<td>Somewhat meets staff’s skill sets: mixed complexity to functions.</td>
<td>Does not suit staff’s skill sets: not fairly intuitive, difficult to use, text-based data/output and requires detailed training.</td>
<td>Does not suit staff’s skill sets: difficult to use and requires detailed training.</td>
</tr>
<tr>
<td>Acquisition of competitive information: (with IntoAction 4.0) provides real time and archived newsfeeds and information via a customizable and integrated news management function.</td>
<td>Cluster is fairly active in competitive research. Software fulfilled all six of the IC employed.</td>
<td>Competitive research is not a priority and is of limited scope and use. Software may be underutilised.</td>
<td>Fulfilled Identifying CI needs and Organisation, storage and retrieval.</td>
<td>Software may be underutilised.</td>
<td>No allocation for competitive research other than track market players. Software may not be utilised.</td>
</tr>
<tr>
<td>Organisation, storage and retrieval: (with Newswire) supported by InTouch Competitor Hotline.</td>
<td>Functions can help users to meet their objectives of making strategic decisions (focus on cash needs for expansion), providing early warning notices (technological shifts and customer perceptions), and providing information about key players (as a source of threat).</td>
<td>Fulfilled Acquisition and Organisation, storage and retrieval.</td>
<td>Functions helped in effectiveness of production processes, uniqueness and appeal of end product, fluctuating trends and preferences of individual clients and tender/bidding CI. Presented new CI scope through identifying CI needs function.</td>
<td>Less to low interest in other functions.</td>
<td>Functions somewhat helped in pricing (cost efficiency), client perceptions (marketing education programmes, competitive pricing certifiable reputation and academic standards) and identifying possible alliances.</td>
</tr>
<tr>
<td>Analysis</td>
<td>Does not suit staff’s skill sets: not fairly intuitive, difficult to use and requires some training.</td>
<td>Competitive research is conducted but of limited scope. Software may be underutilised.</td>
<td>Functions helped in pricing (tariff prices and regulations, cost efficiency), customer perceptions (scope of competition’s products and services offering) and telecommunication trends (Internet based advances).</td>
<td>High regard for software’s Analysis.</td>
<td>Software lacks Analysis. Somewhat meets Development of CI products and Distribution of reports.</td>
</tr>
<tr>
<td>Development of CI products: Produces charts, graphs and over 150 reporting templates.</td>
<td>Functions to monitor brand, technology advances, logistics and communications. Also provides information about possible alliances and expansion into Asia.</td>
<td>Functions helped in effectiveness of production processes, uniqueness and appeal of end product, fluctuating trends and preferences of individual clients and tender/bidding CI. Presented new CI scope through identifying CI needs function.</td>
<td>Functions helped in effectiveness of production processes, uniqueness and appeal of end product, fluctuating trends and preferences of individual clients and tender/bidding CI. Presented new CI scope through identifying CI needs function.</td>
<td>Functions helped in effectiveness of production processes, uniqueness and appeal of end product, fluctuating trends and preferences of individual clients and tender/bidding CI. Presented new CI scope through identifying CI needs function.</td>
<td>Functions somewhat helped in pricing (cost efficiency), client perceptions (marketing education programmes, competitive pricing certifiable reputation and academic standards) and identifying possible alliances.</td>
</tr>
<tr>
<td>Distribution of CI products: Various formats and compatible with IntoAction.</td>
<td>Systems security</td>
<td>Systems integration</td>
<td>Mobile/wireless technology</td>
<td>Shared Services</td>
<td></td>
</tr>
<tr>
<td>Hardware/ electronics design</td>
<td>Systems security</td>
<td>Systems integration</td>
<td>Mobile/wireless technology</td>
<td>Shared Services</td>
<td></td>
</tr>
<tr>
<td>Staff may have skill sets but no specialisation.</td>
<td>Does not suit staff’s skill sets and no staff allocation.</td>
<td>Staff may have skill sets and no staff allocation.</td>
<td>Staff may have skill sets but no specialisation.</td>
<td>Staff may have skill sets but no specialisation.</td>
<td></td>
</tr>
<tr>
<td>Interested in conducting competitive research. Software may be integrated into decision-making.</td>
<td>Not capable of conducting CI. Software may not be utilised.</td>
<td>Positive associations for competitive research. Software may be integrated into decision-making.</td>
<td>Limited allocation for competitive research. Software may be underutilised.</td>
<td>Limited allocation for competitive research. Software may be underutilised.</td>
<td></td>
</tr>
<tr>
<td>Fulfilled Acquisition; Organisation, storage and retrieval; Development and Distribution of CI products.</td>
<td>In favour of Acquisition and Distribution only.</td>
<td>Interest in Analysis, Develop and Distribute products.</td>
<td>Interest in all functions. Concern for Analysis support.</td>
<td>Interest in Analysis and high regard for Develop and Distribute products.</td>
<td></td>
</tr>
<tr>
<td>Functions to monitor brand, technology advances, logistics and communications. Also provides information about possible alliances and expansion into Asia.</td>
<td>Functions for brand development and monitoring of acquisitions.</td>
<td>Functions to help brand development; match objectives of companies to parallel their customer’s needs and, information about changes in related technology.</td>
<td>Functions to anticipate clients’ needs and monitor competition’s services’ suite and capabilities.</td>
<td>Functions to anticipate clients’ needs and monitor competition’s services’ suite and capabilities.</td>
<td></td>
</tr>
<tr>
<td>No to low interest in other functions.</td>
<td>No to low interest in other functions.</td>
<td>Low interest and value in other functions.</td>
<td>Low interest and value in other functions.</td>
<td>Low interest and value in other functions.</td>
<td></td>
</tr>
<tr>
<td>Systems requirements</td>
<td>Software developers</td>
<td>Production &amp; design</td>
<td>Telecommunications</td>
<td>Content development</td>
<td>Education &amp; training</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------</td>
<td>---------------------</td>
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<td>---------------------</td>
</tr>
<tr>
<td>Strategy! Requires at least Windows 95, a Pentium 100MHz processor and 24 megabyte of RAM or more.</td>
<td>• Simple technology structure with low accessibility to resources. 63% were server enabled and 96% are Window-based, have sufficient processing speed and RAM. Can install and have sufficient capacity to use.</td>
<td>• Low levels of technology structure with low accessibility to resources. 55% were server enabled and majority are Window-based, have sufficient processing speed and RAM. Can install and have sufficient capacity to use.</td>
<td>• Simple technology structure with low accessibility to resources. 50% were server enabled and 94% are Window-based, have sufficient processing speed and RAM. Can install and have sufficient capacity to use.</td>
<td>• Simple technology structure with low accessibility to resources. 58% were server enabled and a majority a Window-based, have sufficient processing speed and RAM. Can install and have sufficient capacity to use.</td>
<td>• Simple technology structure with low accessibility to resources. 40% were server enabled (60% not server enabled) and 100% are Window-based, have sufficient processing speed and RAM. Might have insufficient allocation to install.</td>
</tr>
<tr>
<td>Hardware/electronics design</td>
<td>Systems security</td>
<td>Systems integration</td>
<td>Mobile/wireless technology</td>
<td>Shared Services</td>
<td></td>
</tr>
<tr>
<td>• Complex technology structure with high accessibility to resources. 58% were server enabled and 100% are Window-based, have sufficient processing speed and RAM. Can install and have sufficient capacity to use.</td>
<td>• Complex technology structure with high accessibility to resources. 71% were server enabled and 100% are Window-based, have sufficient processing speed and RAM. Can install and have sufficient capacity to use.</td>
<td>• Simple technology structure with high accessibility to resources. 94% were server enabled and 100% are Window-based, have sufficient processing speed and RAM. Might have insufficient allocation to install.</td>
<td>• Complex technology structure with low accessibility to resources. 39% were server enabled (57% not server enabled) and a majority are Window-based, have sufficient processing speed and RAM. Might have insufficient allocation to install.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other criteria</td>
<td>Software developers</td>
<td>Production &amp; design</td>
<td>Telecommunications</td>
<td>Content development</td>
<td>Education &amp; training</td>
</tr>
<tr>
<td>Cost: Strategy! $7500 - Into Action: $11,800 Newsroom: $22,000/year</td>
<td>• 71% high concerns on price and 66% would not spend for CI software. Software can be integrated into their decision-making process and their strategic direction. Price is a deterrent.</td>
<td>• 58% high concerns on price and 36% no allocation for CI software. 61% are doubtful of its usage. Software can be installed, but might be under utilized.</td>
<td>• 72% high concerns on price and 44% would not spend for CI software. 50% are doubtful of its usage and 33% its applicability to structure. Price and applicability are deterrents.</td>
<td>• 72% high concerns on price and 53% would not spend for CI software. 50% are doubtful of its usage, 41% concerned with training, 33% have moderate concerns for security and 25% for maintenance. Price and usage are deterrents.</td>
<td>• 45% high concerns on price and 25% would not spend anything for CI software. 50% are doubtful of its usage, 25% concerned with credibility and 25% concerned with applicability. Might have insufficient allocation to install.</td>
</tr>
<tr>
<td>Hardware/electronics design</td>
<td>Systems security</td>
<td>Systems integration</td>
<td>Mobile/wireless technology</td>
<td>Shared Services</td>
<td></td>
</tr>
<tr>
<td>• 71% high concerns on price and 66% would not spend for CI software. Software can be integrated into their decision-making process and their strategic direction. Price is a deterrent.</td>
<td>• 57% high concerns on price and 36% would not spend anything for CI software. 52% are doubtful of its usage. Price and usage are deterrents.</td>
<td>• 55% high concerns on price. 35% are doubtful of its usage, 27% for maintenance, 33% for training and 38% for its applicability to structure. Price and usage are deterrents.</td>
<td>• 82% high concerns on price and 45% no allocation for CI software. 34% are doubtful of its usage, 30% for maintenance. Price is a deterrent.</td>
<td>• 64% high concerns on price and 17% would not spend for CI software. 53% are doubtful of its usage, 35% for technology requirements and 38% for its applicability to structure. Price and usage are deterrents.</td>
<td></td>
</tr>
</tbody>
</table>

Cost: Strategy! $7500 - Into Action: $11,800 Newsroom: $22,000/year

Usage: Individual or Enterprise use

Functions more efficiently with Into Action and Newsroom.
Traction 3.7

Traction version 3.7 was an application designed to manage competitive information, analyse the information by project, and automatically distribute it, at the same time, adding value at each phase of the intelligence cycle.

The evaluation began with a look at the software's functions that supported users in identifying CI needs. When defining objectives and assigning Key Intelligence Topics to each objective in the first phase of the intelligence cycle, definitions could be documented in a Traction project page on a company's intranet. By doing so, information from published and primary sources was collected by capturing content flowing from sources including e-mail, Web content, external news feeds, or business analysis systems. The application allowed for clipping and collecting information from sources with Traction Instant Publisher (a smaller supporting application that comes with Traction) or sending email directly to a Traction project, or enabling automated systems to post to Traction via basic HTTP protocol.

Organisation, analysis and reporting used the software's journal-based organisation tool that recorded information by time and topic. The software also enabled users to upload comments, links and labels, which made it possible to project analysis into source material, while it made it possible for the reader to find key points within what would otherwise be too much information. Labels could be applied to a number of different categories of intelligence taxonomy, such as:

- Pricing practices, market trends, competitor actions and movements, and key intelligence topics
- Rating credibility or relevance of human intelligence information
- Alerting to critical information that may impact current programmes and providing users links to relevant information required to initiate a decision making process

The application of comments and labels to articles, and paragraphs within, was an act of analysis, which allowed the user to embed strategic implications within the source information, though the software did not include more sophisticated analytical tools. The result was a well-ordered body of information and a more informed reader. When it came time to writing a report or answer an inquiry, the Traction Collector function allowed users to publish articles with references to original sources captured over time.

Traction selectively disseminated information to stakeholders based on project news pages they have
permission to read. The same information could appear in multiple projects without duplication. Information posted to the software could appear in a user-specific Executive Summary section, delivered via a daily email newsletter and secure intranet-based project news pages. The automated Executive Summary email newsletter enabled users to remain peripherally aware of market activities without the burden of trying to make sense of and store away disjointed email messages. Readers could navigate through news pages or search the system by any combination of project, label, author, time, and full text.

The Traction Instant Publisher (TIP) also enabled users to capture text and graphics from news sources, bulletin boards, competitor product pages and all other forms using a right click function from Internet Explorer. The TIP included a reference to source and can attach a local archive of the source web page.

Traction supported HTML Post, SOAP and XML-RPC protocols, which enabled users to write an interface from third party spidering technologies into Traction. A search engine could likewise categorise the information as it posts it to Traction. The same protocols applied to spiders and data mining tools that used the software as a source for information. In addition, the software could produce information in an XML format and another format suitable for search engines. Labels could be used to rate the relevance, credibility, priority or any other user driven parameter that could apply to information. In addition, the information could be broken down to paragraphs and it can be further summarised by title, title and first paragraph, title and relevant paragraphs or full article views. Also, email sent into the software could be automatically categorised based on the target email alias, text in the title, or text in the body.

Cataloguing was done by label. Articles could be retrieved based on Title, Text, Label(s), Project(s), Author(s) and Time. Relationships could be expressed in linear command searches, such as A and B labels must be on the same paragraph of an article posted in the C project by the D user in the month of January, making the searches dynamic. Bookmarking was done with the Traction Collector. Each user could have any number of Collections. Users could right click any article in Traction to put that article into a Collection, from which point that Collection could be viewed, emailed, exported to a PDF briefing, or poured into a new Traction Article (for example, a report) that references the selected source information. Archive in Traction was automatic, keeping a history of all versions and actions.

A typical starting point is $4,995 for the 15 user / 5 project software license and $5,000 to $10,000 for professional services, which included consulting, training and assistance in minor modifications.
Table 7.2b: Overview of evaluation studies for Traction 3.7 and its comparable fit with SME clusters’ CI requirements.

<table>
<thead>
<tr>
<th>Software Evaluation Factors</th>
<th>Cluster structure and contextual characteristics overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI Process</td>
<td>Software developers</td>
</tr>
<tr>
<td>An application software to manage CI, analyse information by project, and automatically distribute.</td>
<td>• Might suit staff’s skill sets; but requires familiarity.</td>
</tr>
<tr>
<td></td>
<td>• Fairly active in competitive research. Software did not meet any of the six IC employed.</td>
</tr>
<tr>
<td></td>
<td>• Functions can help users to meet their objectives of making strategic decisions (focus on cash needs for expansion), providing early warning notices (technological shifts and customer perceptions), and providing information about key players (as a source of threat).</td>
</tr>
<tr>
<td></td>
<td>• Effective method of recording information and applying labels, and customisation capabilities.</td>
</tr>
<tr>
<td></td>
<td>Production &amp; design</td>
</tr>
<tr>
<td></td>
<td>• Might suit staff’s skill sets; but requires familiarity.</td>
</tr>
<tr>
<td></td>
<td>• Competitive research is not a priority and is of limited scope and use. Software is efficient in developing varied and various reports.</td>
</tr>
<tr>
<td></td>
<td>• Met Acquisition (must know KIT beforehand) and Organisation, storage and retrieval. Fulfilled Development and Distribution.</td>
</tr>
<tr>
<td></td>
<td>• Functions helped in uniqueness and appeal of end product, fluctuating trends, and preferences of individual clients. Did not meet effectiveness of production processes and tendering/bidding CI.</td>
</tr>
<tr>
<td></td>
<td>Telecommunications</td>
</tr>
<tr>
<td></td>
<td>• Might suit staff’s skill sets; but requires familiarity.</td>
</tr>
<tr>
<td></td>
<td>• Effective method of recording information and applying labels, and customisation capabilities.</td>
</tr>
<tr>
<td></td>
<td>• Met identifying CI needs. Somewhat met Organisation, storage and retrieval through customised management of information.</td>
</tr>
<tr>
<td></td>
<td>• Functions helped in pricing (tariff prices and regulations, cost efficiency), customer perceptions (scope and quality of competition’s services) and technology trends (Internet and software advances).</td>
</tr>
<tr>
<td></td>
<td>Content development</td>
</tr>
<tr>
<td></td>
<td>• Might suit staff’s skill sets; but requires familiarity.</td>
</tr>
<tr>
<td></td>
<td>• Competitive research is not a priority and is of limited scope and use. Software may not be utilised.</td>
</tr>
<tr>
<td></td>
<td>• Functions somewhat helped in pricing (cost efficiency), client perceptions (scope and quality of competition’s services) and technology trends (Internet and software advances).</td>
</tr>
<tr>
<td></td>
<td>• Effective method of recording information and applying labels, and customisation capabilities.</td>
</tr>
<tr>
<td></td>
<td>Education &amp; training</td>
</tr>
<tr>
<td></td>
<td>• Might suit staff’s skill sets; but requires familiarity.</td>
</tr>
<tr>
<td></td>
<td>• No allocation for competitive research other than track market players. Software may not be utilised.</td>
</tr>
<tr>
<td></td>
<td>• Functions somewhat helped in pricing (cost efficiency), client perceptions (marketing education programmes, competitive pricing certifiable reputation and academic standards) and identifying possible alliances.</td>
</tr>
<tr>
<td></td>
<td>• Somewhat meet Development of CI products and Distribution of reports.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware/electronics design</th>
<th>Systems security</th>
<th>Systems Integration</th>
<th>Mobile/wireless technology</th>
<th>Shared Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Might suit staff’s skill sets but no specialisation.</td>
<td>• Might suit staff’s skill sets but lacks accessibility to resources.</td>
<td>• Staff may have skill sets and allocation.</td>
<td>• Might suit staff’s skill sets but no staff allocation.</td>
<td></td>
</tr>
<tr>
<td>• Interested in conducting competitive research. Software has limited functions and did not meet requirements.</td>
<td>• Not capable of conducting CI. Software may not be utilised.</td>
<td>• Positive associations for competitive research. Software did not meet requirements other than Acquisition.</td>
<td>• Limited allocation for competitive research. Software may be underutilised.</td>
<td></td>
</tr>
<tr>
<td>• Fulfilled Acquisition, Organisation, storage and retrieval; met Development and Distribution of CI products.</td>
<td>• Lacks Analysis, Development and Distribution of CI products.</td>
<td>• Software Lacks Analysis.</td>
<td>• Software Lacks Analysis and Options for Development and Distribution of CI products.</td>
<td></td>
</tr>
<tr>
<td>• Functions to monitor brand, technology advances, logistics and communications. Also provided information about possible alliances and expansion into Asia.</td>
<td>• Functions to help brand development; match objectives of companies to parallel their customer’s needs and, information about changes in related technology.</td>
<td>• Functions to monitor related technology “race”, competitors’ technology developments and service suite of service providers.</td>
<td>• Functions to anticipate clients’ needs and monitor competition’s services’ suite and capabilities.</td>
<td></td>
</tr>
<tr>
<td>• Fulfilled Acquisition by documenting definitions and assigning KIT to objectives.</td>
<td>• Met Distribution criteria.</td>
<td>• Effective method of recording information and applying labels, and customisation capabilities.</td>
<td>• Met Distribution.</td>
<td></td>
</tr>
<tr>
<td>• Functions for brand development and monitoring acquisitions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software Evaluation Factors</td>
<td>Cluster structure and operations overview</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Systems Requirements</strong></td>
<td><strong>Software developers</strong></td>
<td><strong>Production &amp; design</strong></td>
<td><strong>Telecommunications</strong></td>
<td><strong>Content development</strong></td>
</tr>
<tr>
<td>Recommended minimum server hardware:</td>
<td>• Simple technology structure with low accessibility to resources.</td>
<td>• Low levels of technology structure with low accessibility to resources.</td>
<td>• Simple technology structure with low accessibility to resources.</td>
<td>• Complex technology structure with high accessibility to resources.</td>
</tr>
<tr>
<td>Processor: Pentium 2Ghz</td>
<td>63% were server enabled and 96% are Window-based, have sufficient processing speed and RAM.</td>
<td>55% were server enabled and majority is Window-based, have sufficient processing speed and RAM.</td>
<td>50% were server enabled and a majority a Window-based, have sufficient processing speed and RAM.</td>
<td>58% were server enabled and a majority a Window-based, have sufficient processing speed and RAM.</td>
</tr>
<tr>
<td>Disk Space: 5 GB RAM: 1 GB</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
</tr>
<tr>
<td></td>
<td>• Complex technology structure with high accessibility to resources.</td>
<td>• Complex technology structure with high accessibility to resources.</td>
<td>• Complex technology structure with high accessibility to resources.</td>
<td>• Complex technology structure with high accessibility to resources.</td>
</tr>
<tr>
<td></td>
<td>58% were server enabled and 100% are Window-based, have sufficient processing speed and RAM.</td>
<td>71% were server enabled and 100% are Window-based, have sufficient processing speed and RAM.</td>
<td>94% were server enabled and 100% are Window-based, have sufficient processing speed and RAM.</td>
<td>39% were server enabled (57% not server enabled) and a majority are Windows-based, have sufficient processing speed and RAM.</td>
</tr>
<tr>
<td></td>
<td>Can install and have sufficient capacity to use.</td>
<td></td>
<td>Might have insufficient allocation to install.</td>
<td>Might have insufficient allocation to install.</td>
</tr>
<tr>
<td><strong>Other criteria</strong></td>
<td><strong>Software developers</strong></td>
<td><strong>Production &amp; design</strong></td>
<td><strong>Telecommunications</strong></td>
<td><strong>Content development</strong></td>
</tr>
<tr>
<td>Cost:</td>
<td>• 71% high concerns on price and 66% would not spend for CI software.</td>
<td>• 58% high concerns on price and 36% no allocation for CI software.</td>
<td>• 72% high concerns on price and 44% would not spend for CI software.</td>
<td>• 72% high concerns on price and 53% would not spend for CI software.</td>
</tr>
<tr>
<td>Traction:</td>
<td>Software can be installed, but price, applicability and time are deterrents.</td>
<td>Software can be installed, but price, applicability and time are deterrents.</td>
<td>Price and applicability are deterrents.</td>
<td>Price and applicability are deterrents.</td>
</tr>
<tr>
<td></td>
<td>$4995 (15 users or 5 licenses)</td>
<td>61% are doubtful of its usage.</td>
<td>50% are doubtful of its usage and 33% its applicability to structure.</td>
<td>Price and applicability are deterrents.</td>
</tr>
<tr>
<td>Professional services:</td>
<td>$5000 to $10000</td>
<td>Software can be installed, but price, applicability and time are deterrents.</td>
<td>Price and applicability are deterrents.</td>
<td>Price and applicability are deterrents.</td>
</tr>
<tr>
<td><strong>Usability</strong></td>
<td><strong>Software developers</strong></td>
<td><strong>Production &amp; design</strong></td>
<td><strong>Telecommunications</strong></td>
<td><strong>Content development</strong></td>
</tr>
<tr>
<td>Individual or Enterprise use:</td>
<td>• 5% high concerns on price and 3% would not spend anything for CI software.</td>
<td>• 57% high concerns on price and 14% would not spend anything for CI software.</td>
<td>• 55% high concerns on price and 27% for maintenance, 33% for training and 38% for its applicability to structure.</td>
<td>• 82% high concerns on price and 45% no allocation for CI software.</td>
</tr>
<tr>
<td>Functions more efficiently with IntoAction and Newsroom:</td>
<td>• 52% are doubtful of its usage.</td>
<td>• 28% are doubtful of its usage, maintenance and expertise respectively.</td>
<td>• 5% high concerns on price and 34% are doubtful of its usage, 30% for maintenance.</td>
<td>• Price and time are deterrents.</td>
</tr>
<tr>
<td></td>
<td>Price, usage and time are deterrents.</td>
<td></td>
<td>Price and time are deterrents.</td>
<td></td>
</tr>
</tbody>
</table>
Wincite 8.2

Wincite was considered in this evaluation as the most ‘experienced’ software package, being one of the pioneers in CI software. The Wincite 8.2 system was designed to support several related areas of intelligence in a business organisation including competitive intelligence, strategic and tactical planning, field sales force intelligence support and executive information portals. The software managed information from many different sources and formats using a relational database that links to both LAN workstations and intranet browser users.

In supporting the first phase of the intelligence cycle, the software could be customised to provide a Key Intelligence Process component, which was a screen to plan and provide a structure for Key Intelligence Questions. Typically these screens had topics related to competitors, products, customers, markets, projects, and search tools. The screens were designed to make it easy for a user to navigate the contents of the database and view information sources and analysis that supported planning and business decision activities. Users have the option of summarising the information in the screens into profile and benchmark reports. These reports could be printed, emailed or downloaded in Excel, Word, or PowerPoint file formats. Users in a company, with appropriate security permissions, and knowledgeable in Microsoft Office applications, could add subjects, and design new screens without technical support.

In terms of organising, storage and retrieval of intelligence, this software mostly assigned the task of collecting and managing competitive information to users. Wincite has a unique database customisation function called screen painter, which allowed users to design and customise the database’s interface. Different user groups could have unique home page portals to access portions of the database that were relevant to their areas of responsibility, level of security clearance and interests.

In acquiring the intelligence, unlike most other high-end CI software packages, it did not incorporate any software agents to gather information from websites dynamically. The people at Wincite justified this by stating that spiders were far from accurate at assessing the relevancy of incoming information. Therefore, the functions that related to the second and third phase of the intelligence cycle did not have an extension to sophisticated analysis capabilities. In terms of analysis, it seemed that the software was content with the notion that software technology will never replace human analytical capabilities. However, it did provide sections on analytical frameworks based on the SWOT analysis, Porter’s Five Forces, Supply
Chain Analysis, Four Square Analysis, and links to search engines. Along with the frameworks, the software was also able to produce charts to compare companies and activities.

From the databases, reports could be generated and viewed in an intranet browser, attached to email, or disseminated in other file formats. Intelligence could also be generated through the software’s CI Newsletter capability, which allowed users to capture news in a screen and then format it using a profile report and send it out as a daily news alert.

As for prices, the one time software license for a Wincite application running on a local area network (LAN) is $15,000 for an unlimited number of seats. eWincite was an add on module that connects the LAN database application to a company’s intranet. Users, with security permissions, could view Wincite screens and report using a browser. With the appropriate security permissions, a browser user could also enter information into the application. When Wincite LAN and eWincite are purchased as a package the price is $25,000. Support services for the design, implementation and training of an initial application, is in the $10,000 to $30,000 range including 10 to 35 customised screens. A $5,000 to $6,000 annual fee was charged for to support, maintenance, and system upgrades.
Table 7.2c: Overview of evaluation studies for Wincite 8.2 and its comparable fit with SME clusters’ CI requirements.

<table>
<thead>
<tr>
<th>CI Process</th>
<th>Software developers</th>
<th>Production &amp; design</th>
<th>Telecommunications</th>
<th>Content development</th>
<th>Education &amp; training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying CI needs</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
</tr>
<tr>
<td>Competitive research</td>
<td>• Fairly active in competitive research. Software fulfilled all six of the IC employed.</td>
<td>• Competitive research is not a priority and is of limited scope and use. Software may be underutilised.</td>
<td>• Competitive research is conducted. Software may be integrated into decision-making.</td>
<td>• Competitive research is not a priority and is of limited scope and use. Software may be underutilised.</td>
<td>• No allocation for competitive research other than track market players. Software may be underutilised.</td>
</tr>
<tr>
<td>Acquiring competitive information</td>
<td>• Functions can help users to meet their objectives of making strategic decisions (focus on cash needs for expansion), providing early warning notices (technological shifts and customer perceptions), and providing information about key players (as a source of threat).</td>
<td>• Functions helped in effectiveness of production processes, uniqueness and appeal of end product, fluctuating trends and preferences of individual clients and tender/bidding CI. Presented new CI scope through identifying CI needs function.</td>
<td>• Functions helped in pricing (tariff prices and regulations, cost efficiency), customer perceptions (scope of competition's products and services offering) and telecommunication trends (Internet based advances).</td>
<td>• Less to low interest in other functions.</td>
<td>• Functions somewhat helped in pricing (cost efficiency), client perceptions (marketing education programmes, competitive pricing certifiable reputation and academic standards) and identifying possible alliances.</td>
</tr>
<tr>
<td>Analysis: SWOT, Porter's Five Forces, Supply Chain Analysis, Four Square Analysis and links to search engines.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
</tr>
<tr>
<td>Development of CI products: Summarised profile and benchmark reports</td>
<td>• Interested in conducting competitive research. Software may be integrated into decision-making.</td>
<td>• While capable but not interested in conducting CI, software might be utilised as ease of use and functions meet requirements.</td>
<td>• Not capable of conducting CI. Software met requirements and might be utilised.</td>
<td>• Positive associations for competitive research. Software might be utilised.</td>
<td>• Functions fulfilled Analysis and Develop and Distribute products.</td>
</tr>
<tr>
<td>Distribution of CI products: email attachment, and Microsoft Office</td>
<td>• Fulfilled Acquisition; Organisation, storage and retrieval; Development and Distribution of CI products. Lacks Analysis.</td>
<td>• Fulfilled Acquisition and Distribution.</td>
<td>• Fulfilled Analysis, Develop and Distribute products.</td>
<td>• Fulfilled Analysis and Develop and Distribute products.</td>
<td>• Functions to anticipate clients' needs and monitor competition's services' suite and capabilities.</td>
</tr>
</tbody>
</table>

**Software**

<table>
<thead>
<tr>
<th>Hardware/electro. design</th>
<th>Systems security</th>
<th>Systems integration</th>
<th>Mobile/wireless technology</th>
<th>Shared Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
<td>• Might suit staff's skill sets: Similar to Microsoft Office applications.</td>
</tr>
<tr>
<td>• Interesting in conducting competitive research. Software may be integrated into decision-making.</td>
<td>• While capable but not interested in conducting CI, software might be utilised as ease of use and functions meet requirements.</td>
<td>• Not capable of conducting CI. Software met requirements and might be utilised.</td>
<td>• Positive associations for competitive research. Software might be utilised.</td>
<td>• Functions fulfilled Analysis and Develop and Distribute products.</td>
</tr>
<tr>
<td>• Functions to monitor brand, technology advances, logistics and communications. Also provides information on possible alliances and expansion into Asia.</td>
<td>• Fulfilled Acquisition; Organisation, storage and retrieval; Development and Distribution of CI products. Lacks Analysis.</td>
<td>• Fulfilled Acquisition and Distribution.</td>
<td>• Fulfilled Analysis, Develop and Distribute products.</td>
<td>• Functions to anticipate clients' needs and monitor competition's services' suite and capabilities.</td>
</tr>
<tr>
<td>Cluster structure and operations overview</td>
<td>Software developers</td>
<td>Production &amp; design</td>
<td>Telecommunications</td>
<td>Content development</td>
</tr>
<tr>
<td>-----------------------------------------</td>
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</tr>
<tr>
<td>Systems requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windows NT 4.0, Workstation</td>
<td>• Simple technology structure with low accessibility to resources.</td>
<td>• Low levels of technology structure with low accessibility to resources.</td>
<td>• Simple technology structure with low accessibility to resources.</td>
<td>• Complex technology structure with high accessibility to resources.</td>
</tr>
<tr>
<td>with low accessibility to requirements</td>
<td>• 63% were server enabled and 96% are Window-based, have sufficient processing speed and RAM.</td>
<td>• 55% were server enabled and majority is Window-based, have sufficient processing speed and RAM.</td>
<td>• 50% were server enabled and majority is Window-based, have sufficient processing speed and RAM.</td>
<td>• 58% were server enabled and a majority are Window-based. Have sufficient processing speed and RAM.</td>
</tr>
<tr>
<td>Systems</td>
<td>• Can install and have sufficient capacity to use.</td>
<td>• Can install and have sufficient capacity to use.</td>
<td>• Can install and have sufficient capacity to use.</td>
<td>• Can install and have sufficient capacity to use.</td>
</tr>
<tr>
<td>Hardware/ electronics design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windows 2000/XP, 4.0 or Novell Network,</td>
<td>• Complex technology structure with high accessibility to resources.</td>
<td>• Complex technology structure with high accessibility to resources.</td>
<td>• Simple technology structure with low accessibility to resources.</td>
<td>• Complex technology structure with low accessibility to resources.</td>
</tr>
<tr>
<td>Pentium 4, RAM: 512 Mb, Hard Drive: 20GB, TCVIP (client/server configuration),</td>
<td>• 58% were server enabled and 100% are Window-based, have sufficient processing speed and RAM.</td>
<td>• 71% were server enabled and 100% are Window-based, have sufficient processing speed and RAM.</td>
<td>• 94% were server enabled and 100% are Window-based, have sufficient processing speed and RAM.</td>
<td>• 39% were server enabled (57% not server enabled) and a majority are Window-based, have sufficient processing speed and RAM.</td>
</tr>
<tr>
<td>LAN Server</td>
<td>• Can install and have sufficient capacity to use.</td>
<td>• Can install and have sufficient capacity to use.</td>
<td>• Might have insufficient allocation to install.</td>
<td>• Might have insufficient allocation to install.</td>
</tr>
<tr>
<td>Other criteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost: Wincite: $15000 (unlimited users, one time license fee)</td>
<td>• 71% high concerns on price and 66% would not spend for CI software.</td>
<td>• 58% high concerns on price and 36% no allocation for CI software.</td>
<td>• 72% high concerns on price and 44% would not spend for CI software.</td>
<td>• 72% high concerns on price and 53% would not spend for CI software.</td>
</tr>
<tr>
<td>eWincite: $10000 (add on module)</td>
<td>• Software has ease of use but as software is the most expensive price it is a deterrent.</td>
<td>• 61% are doubtful of its usage.</td>
<td>• 50% are doubtful of its usage and 33% its applicability to structure.</td>
<td>• 50% are doubtful of its usage, 41% are concerned with training, 33% have moderate concerns for security and 29% for maintenance.</td>
</tr>
<tr>
<td>Support services: $10000 to $30000</td>
<td>• Price and usage are deterrents.</td>
<td>• Software can be installed and has ease of use, but price is a deterrent.</td>
<td>• Price and applicability are deterrents.</td>
<td>• Price and usage are deterrents.</td>
</tr>
<tr>
<td>Annual fee*: $5000 to $6000</td>
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</tr>
<tr>
<td>Usability: Enterprise use</td>
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</tr>
</tbody>
</table>

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Copernic Pro

Copernic came in three versions: Copernic Basic, Copernic Plus, and the top-of-the-line Copernic Pro. The Copernic Pro was purchased for this evaluation study so as to be able to access and study all available functions and capabilities. The Copernic Pro was essentially a meta-search tool that allowed users to run queries through multiple search engines (over 1000 search engines for over 90 default search categories) simultaneously from a single application.

This meta-search tool allowed users to choose their preferred search engine to be used for each search category in the options menu. This was useful as users were able to see which search engines returned which pages from the results list. If a search engine consistently returns less relevant or irrelevant pages compared to other search engines, which were evident during this evaluation, the user was able to choose to not use that particular search engines in future queries. Another unique feature was the software ability to translate foreign web pages directly from the Copernic interface. In addition to these features, Copernic Pro gave the user the ability to run a modified search within the returned results, schedule updates for queries and receive e-mail notifications when changes or new pages are found.

As a CI software and in terms of the intelligence cycle, Copernic, on its own, mostly facilitated the acquisition of intelligence, though the website referred to the sorting and filtering capabilities to be an analysis function. From the preliminary evaluation, the results from searches returns were scored and displayed according to relevancy. The results could also be sorted by titles, excerpts, addresses, scores, dates found, dates visited, modified or search engines. Essentially, for the CI practitioner who were mostly using the Internet for intelligence, Copernic would be invaluable. Some examples in using the software with the 90+ categories pre-packaged in searches, the ‘Newsgroup’ category allowed the user to find qualitative information; the ‘Web’, along with other categories cover published information; and, the commerce-related search categories could be used to determine competitors’ prices.

Although Copernic was essentially a tool to just acquire intelligence, the Copernic website did give the option of adding other supporting applications, namely the Copernic Tracker and the Copernic Summariser, for the added $49.95 and $59.95 respectively. Copernic Tracker enabled automatic tracking of new content on Web pages, and the users would be notified by e-mail. Apart from summarising,
Copernic Summariser also could highlight key concepts and extracts relevant sentences, and the summaries could be saved in plain text, Microsoft Word, HTML and XML formats. Both supporting applications would add to the analysis function in the intelligence cycle.

The price for the Copernic Pro was $79.95, making it very affordable for SMEs.
Table 7.2d: Overview of evaluation studies for Copernic Pro and its comparable fit with SME clusters' CI requirements.

<table>
<thead>
<tr>
<th>CI Process</th>
<th>Cluster structure and contextual characteristics overview</th>
<th>Software developers</th>
<th>Production &amp; design</th>
<th>Telecommunications</th>
<th>Content development</th>
<th>Education &amp; training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta-search tool software that accesses multiple search engines through a website</td>
<td>• Might suit staff's skill sets: search interface requires some training and familiarity. • Fairly active in competitive research. Software did not meet requirements. • Met Acquiring and Analysis. • Functions helped users to meet their objectives of making strategic decisions (focus on cash needs for expansion), providing early warning notices (technological shifts and customer perceptions), and providing information about key players (as a source of threat). • Has the support of 90+ pre-packaged categories to help obtain information. Newspaper allows users to find qualitative information. • Scored results displayed according to sorted relevancy.</td>
<td>• Might suit staff's skill sets: search interface requires some training and familiarity. • Competitive research is not a priority and might be of limited use. Software might be underutilised. • Fulfilled Identifying CI needs and somewhat met Organisation, storage and retrieval as a manual function. • Functions helped in effectiveness of production processes, uniqueness and appeal of end product, fluctuating trends and preferences of some clients (by industry). Presented new CI scope through identifying CI needs function.</td>
<td>• Might suit staff's skill sets: search interface requires some training and familiarity. • Competitive research is conducted. Software met requirements and might be utilised. • Fulfilled Identifying CI needs and somewhat met Organisation, storage and retrieval as a manual management. Report formats are easily integrated into own reporting system. • Functions helped in pricing (tariff prices and regulations, cost efficiency), customer perceptions (scope of competition's products and services offered) and telecommunications trends (Internet and software advances).</td>
<td>• Might suit staff's skill sets: search interface requires some training and familiarity. • Competitive research is not a priority and is of limited scope and use. Software might be of use. • Fulfilled Analysis requirement. Report formats are easily integrated into own reporting system. • Functions helped in pricing (cost efficiency), client perceptions (marketing strategies), technology trends (Internet and software advances).</td>
<td>• Does not suit staff's skill sets: difficult to use and requires detailed training. • No allocation for competitive research other than track market players. Software is of limited use. • Fulfilled Analysis requirement and able to integrate into own reporting system. • Functions somewhat helped in pricing (cost efficiency), client perceptions (marketing strategies), technology trends (Internet and software advances).</td>
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<td></td>
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<td>• Staff may have skill sets but no allocation.</td>
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<tr>
<td></td>
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<td></td>
<td>• Limited allocation for competitive research. Software might be underutilised. • Fulfilled Analysis and met development and distribution of CI products. • Functions to monitor related technology &quot;race&quot;, competitors' technology developments and service suite of service providers.</td>
</tr>
<tr>
<td></td>
<td>Hardware/electro. design</td>
<td>Systems security</td>
<td>Systems Integration</td>
<td>Mobile/wireless technology</td>
<td>Shared Services</td>
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<tr>
<td></td>
<td>• Might suit staff's skill sets: search interface requires some training and familiarity. • Interested in conducting competitive research. Software met requirements and might be utilised. • Fulfilled Acquiring and Analysis. Manual management of Organisation, storage and retrieval and, development and distribution of CI products. • Functions to monitor technology advances, logistics &amp; communications.</td>
<td>• Staff may have skill sets but lacks accessibility to resources. • Capable but not interested in conducting CI. Software might be underutilised. • Fulfilled Acquiring and met Distribution. • Functions for brand development and monitoring acquisitions.</td>
<td>• Does not suit staff's skill sets and no staff allocation. • Not capable of conducting CI. Software is of limited use. • Fulfilled Analysis. Met development and distribution of CI products. • Functions to help brand development; match objectives of companies to parallel their customer's needs and, information about changes in related technology.</td>
<td>• Staff may have skill sets and allocation. • Positive associations for competitive research. Software met requirements and might be utilised. • Interest in all functions. • Fulfilled Analysis. • Functions to support related technology &quot;race&quot;, competitors' technology developments and service suite of service providers.</td>
<td>• Staff may have skill sets but no allocation.</td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>• Limited allocation for competitive research. Software might be underutilised. • Fulfilled Analysis and met development and distribution of CI products. • Functions to anticipate clients' needs and monitor competition's services' suite and capabilities.</td>
</tr>
<tr>
<td>Hardware/electronics design</td>
<td>Systems Security</td>
<td>Systems Integration</td>
<td>Telecommunications</td>
<td>Content Development</td>
<td>Education &amp; Training</td>
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</tr>
<tr>
<td><strong>Software developers</strong></td>
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<tr>
<td>• Simple technology structure with low accessibility to resources.</td>
<td>• Low levels of technology structure with low accessibility to resources.</td>
<td>• Simple technology structure with low accessibility to resources.</td>
<td>• Complex technology structure with high accessibility to resources.</td>
<td>• Simple technology structure with low accessibility to resources.</td>
<td></td>
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</tr>
<tr>
<td>• 63% were server enabled and 96% are Window-based, have sufficient processing speed and RAM.</td>
<td>• 55% were server enabled and 94% are Window-based, have sufficient processing speed and RAM.</td>
<td>• 50% were server enabled and 94% are Window-based, have sufficient processing speed and RAM.</td>
<td>• 58% were server enabled and a majority a Window-based, have sufficient processing speed and RAM.</td>
<td>• 40% were server enabled (60% not server enabled) and 100% are Window-based, have sufficient processing speed and RAM.</td>
<td></td>
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</tr>
<tr>
<td>• Can install and have sufficient capacity to use.</td>
<td>• Can install and have sufficient capacity to use.</td>
<td>• Can install and have sufficient capacity to use.</td>
<td>• Can install and allocation is for tools, applications and production of end product.</td>
<td>• Might have insufficient allocation to install.</td>
<td></td>
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</tr>
<tr>
<td><strong>Production &amp; design</strong></td>
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</tr>
<tr>
<td>• 58% high concerns on price and 61% are doubtfull of its usage.</td>
<td>• 61% are doubtfull of its usage.</td>
<td>• 50% are doubtfull of its usage and 33% its applicability to structure.</td>
<td>• 72% high concerns on price and 53% would not spend for CI software.</td>
<td>• 45% high concerns on price and 25% would not spend anything for CI software.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Software can be integrated into their decision-making process and their strategic direction. Affordable.</td>
<td>• Affordable and can be installed, but might be under utilised.</td>
<td>• Affordable but applicability is a deterrent.</td>
<td>• 50% are doubtfull of its usage, 41% are concerned with training, 33% have moderate concerns for security and maintenance for maintenance.</td>
<td>• 50% are doubtfull of its usage, 25% concerned with credibility and 25% concerned with applicability.</td>
<td></td>
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</tr>
<tr>
<td><strong>Telecommunications</strong></td>
<td></td>
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</tr>
<tr>
<td>• 72% high concerns on price and 44% would not spend for CI software.</td>
<td>• 72% high concerns on price and 53% would not spend for CI software.</td>
<td>• 72% high concerns on price and 53% would not spend for CI software.</td>
<td>• 82% high concerns on price and 45% no allocation for CI software.</td>
<td>• 64% high concerns on price and 17% would not spend.</td>
<td></td>
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</tr>
<tr>
<td>• 61% are doubtfull of its usage.</td>
<td>• 50% are doubtfull of its usage and 33% its applicability to structure.</td>
<td>• 50% are doubtfull of its usage, 41% are concerned with training, 33% have moderate concerns for security and maintenance for maintenance.</td>
<td>• 34% are doubtfull of its usage, 30% for maintenance.</td>
<td>• 53% are doubtfull of its usage, 35% for technology requirements and 38% for its applicability to structure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Affordable and can be installed, but might be under utilised.</td>
<td>• Affordable but applicability is a deterrent.</td>
<td>• Affordable but applicability is a deterrent.</td>
<td>• Affordable and can be installed, but might be under utilised.</td>
<td>• Affordable and might be under utilised.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Content Development</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 57% high concerns on price and 14% would not spend anything for CI software.</td>
<td>• 55% are doubtfull of its usage, 27% for maintenance, 33% for training and 38% for its applicability to structure.</td>
<td>• 55% high concerns on price.</td>
<td>• 82% high concerns on price and 45% no allocation for CI software.</td>
<td>• 64% high concerns on price and 17% would not spend.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 52% are doubtfull of its usage.</td>
<td>• 55% are doubtfull of its usage, 27% for maintenance, 33% for training and 38% for its applicability to structure.</td>
<td>• 55% high concerns on price.</td>
<td>• 34% are doubtfull of its usage, 30% for maintenance.</td>
<td>• 53% are doubtfull of its usage, 35% for technology requirements and 38% for its applicability to structure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Affordable and can be installed, but might be under utilised.</td>
<td>• Affordable but applicability is a deterrent.</td>
<td>• Affordable and can be installed, but might be under utilised.</td>
<td>• Affordable and can be installed, but might be under utilised.</td>
<td>• Affordable and might be under utilised.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Evaluation Factors**

**Cluster structure and operations overview**

**Systems requirements**

Copernic Pro requires Windows 95 or later. At least 25Mb of hard disk space.

**Other criteria**

Cost:
- Copernic Pro $79.95
- Copernic Tracker $49.95
- Copernic Summariser $59.95

Cost:
- Windows 95 or later
- At least 25Mb of hard disk space

**Usability:** Individual use

- Functions more efficiently with support suite.
- 57% high concerns on price and 36% would not spend anything for CI software.
- 52% are doubtfull of its usage. Affordable and can be installed, but might be under utilised.

- 55% high concerns on price.
- 55% are doubtfull of its usage, 27% for maintenance, 33% for training and 38% for its applicability to structure.
- Affordable and can be installed, but might be under utilised.

- 82% high concerns on price and 45% no allocation for CI software.
- 34% are doubtfull of its usage, 30% for maintenance.
- Affordable and can be installed, but might be under utilised.

- 64% high concerns on price and 17% would not spend.
- 53% are doubtfull of its usage, 35% for technology requirements and 38% for its applicability to structure.
- Affordable and might be under utilised.
Botbox PA

Botbox PA, which stood for Personal Assistant, came in two versions: Botbox PA Lite and the full-featured Botbox PA, which was the one purchased for this evaluation study. This software was basically a news collector that detected changes in the websites pre-selected by the user. The user was able to choose from a large list of news sources and categories set on default. Like Copernic, Botbox was selected for the evaluation as one of three low-cost applications in the consideration of the more financially-challenged SMEs. Although from the preliminary evaluation, the software gave an impression of being an invaluable tool for a systematic way of acquiring intelligence, as the main evaluation study started and had covered more depth, the software's functions were found to be rather limited as a CI software.

Botbox was designed to save the CI practitioner, who frequently uses the Internet, a lot of time by collecting relevant headlines for the user to click and read the actual articles. However, although the software could notify the user in the changes in designated websites, it did not highlight the actual changes. Nonetheless, Botbox provided electronically distributed news from over 3,000 sources in real-time. The search function could take queries and use selected search engines to retrieve and update results from the sources. Users could also decide how often the sources should be refreshed, anywhere between every 10 minutes to once a week. Indeed, the number of sources was very impressive but users would not be able to add sources beyond what is pre-packaged, which was another major drawback. Apart from what was explained here, the rest of the software in terms of functionality and features was only aesthetic, with a range of colours that provides a customisable 'look' to the interface.

All in all, Botbox facilitated CI in terms of the second phase of the intelligence cycle, the acquisition of competitive information. Partially, the application could also support the first phase of the intelligence cycle as when used for preliminary competitive research, it could prompt the user to initiate to finding key topics for competitive analysis.

Botbox PA Lite was available to download for free from the company’s website. The version used for this evaluation study was purchased for $50.
Table 7.2: Overview of evaluation studies for Botbox PA and its comparable fit with SME clusters’ CI requirements.

<table>
<thead>
<tr>
<th>Software Evaluation Factors</th>
<th>Cluster structure and contextual characteristics overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI Process</td>
<td>Software developers</td>
</tr>
<tr>
<td>A software that utilises a</td>
<td>• Might suit staff’s skill sets: easy to use and does not</td>
</tr>
<tr>
<td>spider-like mechanism to</td>
<td>need training.</td>
</tr>
<tr>
<td>collect relevant</td>
<td>• Fairly active in competitive research. Software did not</td>
</tr>
<tr>
<td>headlines published or</td>
<td>meet requirements.</td>
</tr>
<tr>
<td>made available on the Internet</td>
<td>• Somewhat met Acquisition.</td>
</tr>
<tr>
<td>• Identifying CI needs</td>
<td>Functions helped users to meet their objectives of</td>
</tr>
<tr>
<td>through users own</td>
<td>making strategic decisions (focus on cash needs for</td>
</tr>
<tr>
<td>preselected key</td>
<td>expansion), providing early warning notices</td>
</tr>
<tr>
<td>topics for competitive</td>
<td>(technological shifts and customer perceptions), and</td>
</tr>
<tr>
<td>analysis.</td>
<td>providing information about key players (as a source</td>
</tr>
<tr>
<td>• Acquisition of</td>
<td>of threat).</td>
</tr>
<tr>
<td>intelligence through</td>
<td>Must know CI needs before use.</td>
</tr>
<tr>
<td>search facilities from</td>
<td>Lacks variety of development and distribution of CI</td>
</tr>
<tr>
<td>over 3,000 sources in</td>
<td>products.</td>
</tr>
<tr>
<td>real-time.</td>
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<tr>
<td>Organisation, storage</td>
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<tr>
<td>and retrieval as a separate text-</td>
<td></td>
</tr>
<tr>
<td>based window highlighting</td>
<td></td>
</tr>
<tr>
<td>titles of possible relevant topics.</td>
<td>Systems security</td>
</tr>
<tr>
<td>• Might suit staff’s skill sets: easy to use and does not need training.</td>
<td></td>
</tr>
<tr>
<td>• Interested in conducting competitive research. Software did not meet all requirements.</td>
<td></td>
</tr>
<tr>
<td>• Fulfilled Acquisition only.</td>
<td></td>
</tr>
<tr>
<td>• Functions to monitor brand, technology advances, logistics and communications.</td>
<td></td>
</tr>
<tr>
<td>Mobile/wireless technology</td>
<td>Systems Integration</td>
</tr>
<tr>
<td>• Might suit staff’s skill sets: easy to use and does not need training.</td>
<td></td>
</tr>
<tr>
<td>• While not capable of conducting CI, software might fit CI needs.</td>
<td></td>
</tr>
<tr>
<td>• Fulfilled Acquisition only.</td>
<td></td>
</tr>
<tr>
<td>• Functions to help brand development; match objectives of companies to parallel their customer’s needs and, information about changes in related technology.</td>
<td></td>
</tr>
<tr>
<td>Shared Services</td>
<td></td>
</tr>
<tr>
<td>• Might suit staff’s skill sets: easy to use and does not need training.</td>
<td></td>
</tr>
<tr>
<td>• Positive associations for competitive research. Software somewhat met requirements.</td>
<td></td>
</tr>
<tr>
<td>• Fulfilled Acquisition only.</td>
<td></td>
</tr>
<tr>
<td>• Required manual Analysis.</td>
<td></td>
</tr>
<tr>
<td>• Functions to monitor related technology “race”, competitors’ technology developments and service suite of service providers.</td>
<td></td>
</tr>
<tr>
<td>• Might suit staff’s skill sets: easy to use and does not need training.</td>
<td></td>
</tr>
<tr>
<td>• While there is no allocation for competitive research other than track market players, software might fit CI needs.</td>
<td></td>
</tr>
<tr>
<td>• Fulfilled Acquisition but required manual Analysis.</td>
<td></td>
</tr>
<tr>
<td>• Functions somewhat helped in pricing (cost efficiency), client perceptions (scope and quality of competition’s services) and technology trends (Internet and software advances).</td>
<td></td>
</tr>
<tr>
<td>• Might suit staff’s skill sets: easy to use and does not need training.</td>
<td></td>
</tr>
<tr>
<td>• While limited allocation for competitive research, software might be used.</td>
<td></td>
</tr>
<tr>
<td>• Fulfilled Acquisition only.</td>
<td></td>
</tr>
<tr>
<td>• Required manual Analysis and development and distribution of CI providers.</td>
<td></td>
</tr>
<tr>
<td>• Functions to anticipate clients’ needs and monitor competition’s services’ suite and capabilities.</td>
<td></td>
</tr>
<tr>
<td>Systems requirements</td>
<td>Software developers</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Botbox PA requires:</td>
<td>63% were server enabled and 96% are Window-based, have sufficient processing speed and RAM.</td>
</tr>
<tr>
<td>Windows 95 or later</td>
<td>55% were server enabled and majority is Window-based, have sufficient processing speed and RAM.</td>
</tr>
<tr>
<td>At least 25Mb of hard disk space</td>
<td>Can install and have sufficient capacity to use.</td>
</tr>
<tr>
<td>Other criteria</td>
<td>71% high concerns on price and 66% would not spend for CI software.</td>
</tr>
<tr>
<td>Cost:</td>
<td>Very affordable but does not meet all requirements.</td>
</tr>
<tr>
<td>Botbox PA: $50</td>
<td>52% are doubtful of its usage. Very affordable and can be installed.</td>
</tr>
</tbody>
</table>

**Hardware/electronics design**

<table>
<thead>
<tr>
<th>Systems security</th>
<th>Systems integration</th>
<th>Mobile/wireless technology</th>
<th>Shared Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Complex technology structure with high accessibility to resources.</td>
<td>• Complex technology structure with high accessibility to resources.</td>
<td>• Complex technology structure with low accessibility to resources.</td>
<td>46% were server enabled (54% not server enabled) and a majority are Window-based, have sufficient processing speed and RAM.</td>
</tr>
<tr>
<td>58% were server enabled and 100% are Window-based, have sufficient capacity to use.</td>
<td>71% were server enabled and 100% are Window-based, have sufficient processing speed and RAM.</td>
<td>39% were server enabled (57% not server enabled) and a majority are Window-based, have sufficient processing speed and RAM.</td>
<td>Can install and have sufficient capacity to use.</td>
</tr>
<tr>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td></td>
</tr>
</tbody>
</table>
Brimstone v. 2

Brimstone was designed in a relational database structure based on the intelligence cycle. The sole purpose of this system was to support users in terms of competitive intelligence, which was, to provide support in identifying CI needs, acquiring, organising, and managing competitive information, analysis, and developing and distributing CI reports.

In essence, the software provided a means of identifying the relationships between competitors' products, companies and persons, organisations and items and events. It also provided a highly structured framework through which the user could collect information and categorise it along the six pre-packaged categories mentioned above. Information under each of the headings is further broken down into a series of subcategories. For example, the 'Companies' category comprised of 12 subtopics such as Organisation, Finance, Technology and so on; and the 'Persons' and 'Products' categories have 8 and 7 sub-topics respectively. Each sub-topic provides a further set of categories, for example, the 'Relations' subtopic under the Products category consists of 10 sub-subtopics, if you wish, which are 'Distributors', 'Developers', 'Inventors', 'Importers'. 'Exporters', 'Experts', 'Competing Products', 'Complementing Products', 'Producer', and 'Implementer'. However, unlike most other software in this evaluation study that focused on the search and retrieval functions, Brimstone did not possess its own search engine for collecting information. Instead, it used a function called the text analyser that is activated by a right click when users use the Internet. The text analyser was used to scan documents on the Web against a set of key terms to determine if it is relevant to the users' requests. It would then suggest how the retrieved document should be categorised. Once the category was established, the user could then establish a link to the document or manually enter its contents into the database. Information within the database could then be analysed with the help of two analytical tools: cross-tab analysis and network visualisation. Cross-tab analysis allowed users to compare the range of default topics across the subtopics and so on. Network visualisation allowed users to identify relationships between the default topics. The intelligence gathered could then be distributed through a range of reporting formats. In addition, Brimstone had a section that lists the status of each CI activity.

Amongst the three low-cost application evaluated in this study, Brimstone was the only software that facilitated all aspects of the intelligence cycle. In identifying CI needs, the features were limited apart from just its abilities to list and track the user's CI activities, which could give the user perspective in the
structuring and planning aspect of a CI project. In terms of acquiring competitive information, the text analyser was the only related feature though it was very useful in preparation of a more manual way of organising and managing the collected information. With the two analysis functions, the cross-tab analysis and network visualisation, the software could facilitate users in comparing different products and categories, as well as provide key relationships between people, places, organisations, and events; most software packages only focused on only one of these aspects. In addition, Brimstone allowed users to create comparative tables and provide overviews of a particular network of relations. This aspect allowed for users to initiate the fifth and sixth phases of the intelligence cycle, where completed analyses can be distributed by way of hardcopies or exported into a range of formats to shared through e-mail. However, as Brimstone was a standalone application, a drawback was its inability to post the reports directly to the company intranet. All in all, Brimstone was a highly structured CI software and even comparable to the high end CI-packaged applications.

This standalone application was purchased for approximately EUR 250.
<table>
<thead>
<tr>
<th>CI Process Relational database structure based on the Intelligence Cycle to support:</th>
<th>Cluster structure and contextual characteristics overview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Software</strong>&lt;br&gt; <strong>Evaluation Factors</strong></td>
<td><strong>Software developers</strong>&lt;br&gt; Might suit staff's skill sets: search interface requires some training and familiarity.&lt;br&gt; Fairly active in competitive research. Software did not meet requirements.&lt;br&gt; Met all six CI steps but unable to publish reports directly to company's Intranet.&lt;br&gt; Functions helped users to meet their objectives of making strategic decisions (focus on cash needs for expansion), providing early warning notices (technological shifts and customer perceptions), and providing information about key players (as a source of threat).&lt;br&gt;</td>
</tr>
<tr>
<td><strong>Hardware/electronics design</strong>&lt;br&gt; <strong>Systems security</strong>&lt;br&gt; <strong>Systems integration</strong>&lt;br&gt; <strong>Mobile/wireless technology</strong>&lt;br&gt; <strong>Shared Services</strong></td>
<td><strong>Software developers</strong>&lt;br&gt; Might suit staff's skill sets: search interface requires some training and familiarity.&lt;br&gt; Interested in conducting competitive research. Software met requirements and might be utilised.&lt;br&gt; Fulfilled Acquisition and Analysis. Manual management of Organisation, storage and retrieval and, development and distribution of CI products.&lt;br&gt; Functions to monitor brand, technology advances, logistics and communications.&lt;br&gt;</td>
</tr>
</tbody>
</table>

Table 7.2f: Overview of evaluation studies for Brimstone v. 2 and its comparable fit with SME clusters' CI requirements.
### Systems Requirements

- **Microsoft Windows application** that is installed and run on the client’s computer or network. 
- **Pentium MMX** 223 Mhz processor, 32 Mb of RAM and 50Mb of disk space.

<table>
<thead>
<tr>
<th>Software developers</th>
<th>Production &amp; design</th>
<th>Telecommunications</th>
<th>Content development</th>
<th>Education &amp; training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple technology with low accessibility to resources.</td>
<td>Low levels of technology structure with low accessibility to resources.</td>
<td>Simple technology structure with high accessibility to resources.</td>
<td>Complex technology structure with low accessibility to resources.</td>
<td>Simple technology structure with low accessibility to resources.</td>
</tr>
<tr>
<td>63% were server enabled and 96% are Window-based, have sufficient processing speed and RAM.</td>
<td>55% were server enabled and majority is Window-based, have sufficient processing speed and RAM.</td>
<td>50% were server enabled and a majority a Window-based, have sufficient processing speed and RAM.</td>
<td>58% were server enabled and a majority a Window-based, have sufficient processing speed and RAM.</td>
<td>40% were server enabled (60% not server enabled) and 100% are Window-based, have sufficient processing speed and RAM.</td>
</tr>
<tr>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
</tr>
</tbody>
</table>

**Hardware/electronics design**

- Complex technology structure with high accessibility to resources. 
- 58% were server enabled and 100% are Window-based, have sufficient processing speed and RAM. 
- Can install and have sufficient capacity to use. 

**Systems Security**

- Complex technology structure with low accessibility to resources. 
- 71% were server enabled and 100% are Window-based, have sufficient processing speed and RAM. 
- Can install and have sufficient capacity to use. 

**Systems Integration**

- Simple technology structure with high accessibility to resources. 
- 94% were server enabled and 100% are Window-based, have sufficient processing speed and RAM. 
- Can install and have sufficient capacity to use. 

**Mobile/wireless technology**

- Complex technology structure with low accessibility to resources. 
- 39% were server enabled (57% not server enabled) and a majority are Window-based, have sufficient processing speed and RAM. 
- Can install and have sufficient capacity to use. 

**Shared Services**

- Complex technology structure with low accessibility to resources. 
- 46% were server enabled (54% not server enabled) and a majority are Window-based, have sufficient processing speed and RAM. 
- Can install and have sufficient capacity to use. 

### Other Criteria

- **Cost**: EUR 250

<table>
<thead>
<tr>
<th>Software developers</th>
<th>Production &amp; design</th>
<th>Telecommunications</th>
<th>Content development</th>
<th>Education &amp; training</th>
</tr>
</thead>
<tbody>
<tr>
<td>71% high concerns on price and 66% would not spend for CI software.</td>
<td>58% high concerns on price and 36% no allocation for CI software.</td>
<td>72% high concerns on price and 44% would not spend for CI software.</td>
<td>72% high concerns on price and 53% would not spend for CI software.</td>
<td>45% high concerns on price and 25% would not spend anything for CI software.</td>
</tr>
<tr>
<td>Software can be integrated into their decision-making process and their strategic direction.</td>
<td>61% are doubtful of its usage.</td>
<td>50% are doubtful of its usage and 33% its applicability to structure.</td>
<td>50% are doubtful of its usage, 41% are concerned with training, 33% have moderate concerns for security and 35% for maintenance.</td>
<td>50% are doubtful of its usage, 25% concerned with credibility and 25% concerned with applicability.</td>
</tr>
</tbody>
</table>

**Hardware/electronics design**

- 57% high concerns on price and 36% would not spend anything for CI software. 
- 52% are doubtful of its usage. 
- Affordable. 

**Systems Security**

- 57% high concerns on price and 14% would not spend anything for CI software. 
- 28% are doubtful of its usage, maintenance and expertise respectively. 
- 48% have concerns with security. 
- Affordable. 

**Systems Integration**

- 55% high concerns on price. 
- 55% are doubtful of its usage, 27% for maintenance, 33% for training and 38% for its applicability to structure. 

**Mobile/wireless technology**

- 82% high concerns on price and 45% no allocation for CI software. 
- 34% are doubtful of its usage, 30% for maintenance. 
- Affordable. 

**Shared Services**

- 64% high concerns on price and 17% would not spend for CI software. 
- 53% are doubtful of its usage, 35% for technology requirements and 38% for its applicability to structure. 
- Affordable.
Factiva

Unlike the previous CI applications, Factiva was essentially a business information online database. At the beginning of this survey, this detail would not have allowed Factiva to participate in the evaluation. However, due to advances in the Web application layer, upcoming CI software, such as Brimstone and Traction, have introduced online versions accessible via remote servers. The companies behind the software reasoned that, with CI tools and applications moving online rather than as standalone applications or an internal server-based software, CI applications could now able to be closely integrated with resource databases, could be centrally monitored and controlled for upgradeability and maintenance, storage capabilities for users, capable of direct analysis of collected information and could now be suitable for remote consultation for better usability. Although the online version of Brimstone was not fully evaluated during this study, there had been a brief demonstration, showing the application's capabilities and features. From the demonstration, it was found that Brimstone had many similarities in terms of functions and features with the Factiva, as if it was somewhat modelled after it. In fact, comparatively, Factiva seemed to be more comprehensive in terms of its capabilities as a CI application. For this evaluation study, the decision was therefore made to take into account the inclusion of online business information services that had been used in CI practices. According to some CI professionals in industry, the most used online resource/tool for business and competitive intelligence had been Factiva.

According to the company, Factiva was designed to help business professionals, from managers to CEOs, ask the right questions so they can obtain the intelligence they need to make timely, strategic decisions. Essentially, Factiva offered four navigational tabs, which are Search, Track, News Pages, and Companies/Markets. The Search tab provided access to almost 10,000 publications and content from business related Web sites in twenty-two languages. Due to Factiva's partnership with Dow Jones and Reuters, users of Factiva software could also access literally millions of images from these news databases. As with most prominent online information services, Factiva had an elaborate search function called Factiva Intelligence Indexing, which appeared on the interface as a rather long list of categories, where each category can be clicked to list a list of narrower terms and these narrower can then be narrowed further up to five levels of hierarchy. These terms were added to the user's search box to help the user to produce a more refined search. As with all search functions in software, this aspect could partially facilitate the user in identifying CI needs, where users could be prompted to produce key intelligence questions during search activities. The more obvious aspect in CI that Factiva supported very
well was the acquisition phase of the intelligence cycle. Users could also use an alerting tool that continuously monitored up to 6000 publications at the same time, and was able to set the relevance level to high, medium, or any degree of relevance based on the number of search terms that appear in the document.

Factiva, on its own, did not have a good storage and retrieval capability for collected information. Therefore, the management of collected information tended to be more manual, using local storage spaces and local intranet capabilities.

Factiva had the ability to produce detailed information on companies in seventy-two countries. This was provided in the Companies/Markets tab, which consisted of five categories of content, with financial data for 42,500 companies worldwide, 36.5 million Dun & Bradstreet records (with links to full Dun & Bradstreet reports), 30,000 investment analyst reports, stock quotes, and company profiles, overviews, and news. This section comprehensively facilitated the analysis phase of the intelligence cycle as users could use this section to build a list of companies that meet their KIT criteria, and create charts of stocks, funds, and market indices, create and view investment reports on companies, build customised company profiles and make quantitative comparisons and direct effects on companies and stock prices. This section could also produce a timeline or a historical chart, where users can drag the cursor over the chart and view related headlines that were associated with the companies and the situations relating to the cause of the rise and fall in stock prices during that time frame.

Factiva had a strong report building function with a CI-ready template. However, the distribution of CI could only be done manually using the local system and/or intranet.

Factiva offered several pricing options. High-volume searchers and users could attain flat-fee access which started at $1000 a month, and low-volume searchers could require the Individual Subscription option, which offered articles at $2.95 each with an annual fee of $69. Note that individual subscribers could not have access to the Companies/Markets sections of Factiva.
Table 7.2g: Overview of evaluation studies for Factiva and its comparable fit with SME clusters’ CI requirements.

<table>
<thead>
<tr>
<th>Software Evaluation Factors</th>
<th>Cluster structure and contextual characteristics overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI Process</td>
<td>Software developers</td>
</tr>
<tr>
<td>Internet based software</td>
<td>- Might suit staff’s skill sets: search interface requires some training and familiarity.</td>
</tr>
<tr>
<td>containing business</td>
<td>- Fairly active in competitive research. Software meets all requirements.</td>
</tr>
<tr>
<td>information</td>
<td>- Fulfilled all requirements. Some functions were not required.</td>
</tr>
<tr>
<td>- Prompts identification of CI needs.</td>
<td>- Functions helped in pricing (tariff prices and regulations, cost efficiency), customer perceptions (scope of competition’s products and services offering) and telecommunication trends (Internet based advances).</td>
</tr>
<tr>
<td>- Facilitates acquisition of intelligence and analysis.</td>
<td>- Competitive research is not a priority and is of limited scope and use. Software might be of some use.</td>
</tr>
<tr>
<td>- Has four navigational tabs with access to 10,000 publications and content from business-related web sites in twenty-two languages and information of businesses in seventy-two countries.</td>
<td>- Fulfilled all requirements. Some functions were not required.</td>
</tr>
<tr>
<td>- Partnership with Dow Jones and Reuters provides access to millions of images.</td>
<td>- Functions helped in pricing (cost efficiency), client perceptions (scope and quality of competition’s services) and technology trends (Internet and software advances).</td>
</tr>
<tr>
<td>- Multiple types of charts, graphs and comparative analysis. Some information can have automised reports.</td>
<td>- Competition research is not a priority and is of limited scope and use. Software might be of some use.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware/electronics design</th>
<th>Systems security</th>
<th>Systems integration</th>
<th>Mobile/wireless technology</th>
<th>Shared Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Might suit staff’s skill sets: search interface requires some training and familiarity.</td>
<td>- Might suit staff’s skill sets: search interface requires some training and familiarity.</td>
<td>- Might suit staff’s skill sets: search interface requires some training and familiarity.</td>
<td>- Might suit staff’s skill sets: search interface requires some training and familiarity.</td>
<td></td>
</tr>
<tr>
<td>- Interested in conducting competitive research.</td>
<td>- Capable but not interested in conducting CI. Software might be underutilised.</td>
<td>- Not capable of conducting CI. Software is of limited use.</td>
<td>- Staff may have skill sets and allocation.</td>
<td></td>
</tr>
<tr>
<td>- Fulfilled all requirements.</td>
<td>- Fulfilled all requirements.</td>
<td>- Fulfilled all requirements.</td>
<td>- Positive associations for competitive research. Software did not met requirements and might be utilised.</td>
<td></td>
</tr>
<tr>
<td>- Functions to monitor brand, technology advances, logistics and communications.</td>
<td>- Functions to help brand development; match objectives of companies to parallel their customer’s needs and, information about changes in related technology.</td>
<td>- Functions to anticipate clients’ needs and monitor competition’s services’ suite and capabilities.</td>
<td>- Interest in all functions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Fulfilled all requirements.</td>
<td></td>
</tr>
</tbody>
</table>

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### Software Evaluation Factors

#### Systems requirements
- **Hardware**
  - Pentium 100Mhz
  - RAM (32 MB recommended)
  - Modem speed: 56k or above (ISDN, processing speed and RAM)
- **LAN**
  - at least a TI
- **Browsers**
  - Internet Explorer 6.0+ and IE 7.0+, Windows XP, 2000, 98, NT or 95.
  - Firefox 1.0.2
  - Macintosh: Safari 1.2+

#### Other criteria
- **Cost**
  - High-volume users: $1000/month
  - Low-volume users: $2.95/article
  - $69 annual fee
- **Usability**
  - Individual and enterprise use
    - Options come with many support suite

### Cluster structure and operations overview

<table>
<thead>
<tr>
<th>Software developers</th>
<th>Production &amp; design</th>
<th>Telecommunications</th>
<th>Content development</th>
<th>Education &amp; training</th>
</tr>
</thead>
</table>
| **Simple technology structure**
  - with low accessibility to resources.
  - Only requires Internet connection and relevant browser. Accessible.
| **Low levels of technology structure with low accessibility to resources.**
  - Only requires Internet connection and relevant browser. Accessible.
| **Simple technology structure with high accessibility to resources.**
  - Only requires Internet connection and relevant browser. Accessible.
| **Complex technology structure with low accessibility to resources.**
  - Only requires Internet connection and relevant browser. Accessible. |

<table>
<thead>
<tr>
<th>Systems security</th>
<th>Systems integration</th>
<th>Mobile/wireless technology</th>
<th>Shared Services</th>
</tr>
</thead>
</table>
| **Simple technology structure**
  - with high accessibility to resources.
  - Only requires Internet connection and relevant browser. Accessible.
| **Complex technology structure**
  - with low accessibility to resources.
  - Only requires Internet connection and relevant browser. Accessible.
| **Complex technology structure**
  - with low accessibility to resources.
  - Only requires Internet connection and relevant browser. Accessible.
| **Simple technology structure**
  - with low accessibility to resources. |

<table>
<thead>
<tr>
<th>Other criteria</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High-volume users</strong></td>
<td>$1000/month</td>
</tr>
<tr>
<td><strong>Low-volume users</strong></td>
<td>$2.95/article</td>
</tr>
<tr>
<td><strong>$69 annual fee</strong></td>
<td></td>
</tr>
</tbody>
</table>
Like Factiva, another Web-based information service that provided CI capabilities was LexisNexis. Since its introduction in 1980, LexisNexis had evolved into a comprehensive collection of international business information sources in multiple languages. LexisNexis provided a range of search methods to meet different types of information searching needs. The default search section for LexisNexis was the Power Search, which first required users to select at least a source from being able to enter the search statement. This section allowed for sophisticated search strategy construction using Boolean logic, similar to Dialog, with the option to sort by date or relevance, and the indexing tool called SmartIndexing Technology, a similar technology to that used in Factiva. With the indexing tool, when the user enters a search term, a list of broad categories and company names using the word would appear in the index box, with buttons that would add them to the search strategy constructed previously. This could be helpful when dealing with unfamiliar terms or for a more refined search strategy. There was also a Quick Search section for less experienced users or users with simple queries. This section of LexisNexis also allowed users to narrow a search by date, with a drop-down box including Today and Previous 60 Days, Week, Month, 60 Days, 90 Days, Six Months, Year and Two Years. Additionally, the section's Subject Directory was accessible from the Quick Search and the Power Search interfaces. The Directory listed thirty-six categories with brief examples under each heading and further clickable subcategories to further refine the search. These capabilities in the Search sections offered much support for identifying CI needs by prompting users towards a more systematic approach to listing key intelligence questions and topics. Like Factiva, it was also efficient in the acquisition of intelligence, but only for gathering information from online sources, as there were not any provisions or support for primary information gathering and storage.

In terms of analysis, the Company Dossier tool allowed the user to browse in the Industry Hierarchy section, which gave a brief industry overview, with Industry Aggregates and Ratio Analysis, Top Companies, Ratio Components and News. Information from this feature could be exported to the My Portfolio section, which would allow users to customise a market portfolio, along with stock charts of selected companies and relevant news links. This report could be printed as hard copy or could be e-mailed straight from Lexis-Nexis. Prices for LexisNexis vary depending on the number of sources and other customisations, or users could opt for 'pay-as-you-go', which also depends on the type of document required.
### Table 7.2h: Overview of evaluation studies for LexisNexis and its comparable fit with SME clusters’ CI requirements.

<table>
<thead>
<tr>
<th>CI Process</th>
<th>Software Evaluation Factors</th>
<th>Cluster structure and contextual characteristics overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet based software that provides CI capabilities from international business information sources in multiple languages.</td>
<td><strong>Software developers</strong>&lt;br&gt;• Might suit staff's skill sets: search interface requires some training and familiarity.&lt;br&gt;• Fairly active in competitive research. Software met requirements.&lt;br&gt;• Fulfilled all steps.&lt;br&gt;• Functions helped users to meet their objectives of making strategic decisions (focus on cash needs for expansion), providing early warning notices (technological shifts and customer perceptions), and providing information about key players (as a source of threat).</td>
<td><strong>Production &amp; design</strong>&lt;br&gt;• Might suit staff's skill sets: search interface requires some training and familiarity.&lt;br&gt;• Competitive research is not a priority and might be of limited use. Software might be underutilised.&lt;br&gt;• Fulfilled all steps. High regard for Analysis.&lt;br&gt;• Functions helped in effectiveness of production processes, uniqueness and appeal of end product, fluctuating trends and preferences of some clients (by industry).</td>
</tr>
<tr>
<td><strong>Hardware/ electronics design</strong>&lt;br&gt;• Might suit staff's skill sets: search interface requires some training and familiarity.&lt;br&gt;• Interested in conducting competitive research. Software met requirements.&lt;br&gt;• Fulfilled all steps.&lt;br&gt;• Functions to monitor brand, technology advances, logistics and communications.&lt;br&gt;• Timeliness of online information is a concern.</td>
<td><strong>Systems security</strong>&lt;br&gt;• Might suit staff's skill sets: search interface requires some training and familiarity.&lt;br&gt;• Capable but not interested in conducting CI. Software might be underutilised.&lt;br&gt;• Fulfilled all steps.&lt;br&gt;• Functions to help brand development match objectives of companies to parallel their customer’s needs and information about changes in related technology.</td>
<td><strong>Systems integration</strong>&lt;br&gt;• Might suit staff's skill sets: search interface requires some training and familiarity.&lt;br&gt;• Not capable of conducting CI. However, software is of use.&lt;br&gt;• Fulfilled all steps.&lt;br&gt;• Functions to help brand development match objectives of companies to parallel their customer’s needs and information about changes in related technology.</td>
</tr>
<tr>
<td>Systems</td>
<td>Software developers</td>
<td>Production &amp; design</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>requirements</td>
<td>• Simple technology structure with low accessibility to resources.</td>
<td>• Low levels of technology structure with low accessibility to resources.</td>
</tr>
<tr>
<td>Hardware</td>
<td>• 63% were server enabled and 96% are Window-based, have sufficient processing speed and RAM. Can install and have sufficient capacity to use.</td>
<td>• 55% were server enabled and majority is Window-based, have sufficient processing speed and RAM. Can install and have sufficient capacity to use.</td>
</tr>
<tr>
<td>Pentium/100Mhz (or above) RAM 32 MB (64 MB recommended)</td>
<td>Modem speed: 56k or above (ISDN, ADSL or cable modem)</td>
<td>LAN: at least a T1</td>
</tr>
<tr>
<td>Other criteria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost: Lexis-Nexis varies as depends on number of sources and customisations. Have option for 'pay-as-you-go' that depends on type of document and output.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usability: Individual use</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardware/ electronics design</td>
<td>Systems security</td>
<td>Systems integration</td>
</tr>
</tbody>
</table>
7.4 Software Recommendations

This section reports on the comparable fit of the CI software to the requirements of the various SME groups. This is followed by recommendations of appropriate software based on these requirements, which was then demonstrated to representatives of these SMEs to gain feedback on the effectiveness of the analyses, as well as the recommended software's perception of effectiveness and usability. These activities was executed in fulfilment of the fifth, sixth, seventh, and eighth objectives of Aim 2 of the research, which were to make recommendations on suitable CI software packages based on the structures, contexts, key intelligence needs, and focuses on the Intelligence Cycle of each SME group or cluster, to test the overall perceived effectiveness of the recommended CI software packages to prospective users that represent each SME group or cluster, to identify the differences in perceptions of effectiveness between prospective users of different levels or job scopes, and to validate the consistency of the overall findings of the research based on the respondents' perceived effectiveness of CI software. Table 7.3 at the end of this section gives a comparative summary of the conclusions made based on the evaluation study.

For each cluster, the challenge was to recommend an application that fulfilled the appropriate phases of their intelligence cycle, and at the same time, considered their limitations and strengths in terms of their systems requirements, simulation, financial and other miscellaneous criteria.

1. Software developers
   The software developers cluster showed high regard for all of the phases of the intelligence cycle being integrated into the prospective CI software, and most of the companies are very capable of hosting a server-based system; however, the majority do not have or have very little financial allocation for software for CI. Based on their CI software criteria, the only appropriate software to be recommended for software developers was Brimstone.

2. Production and design
   The production and design cluster showed regard for only the acquisition, organisation, storage and retrieval functions in the prospective software. More than half are server enabled, with a rather even distribution of not having any to having a lower medium allocation of finance for CI software. Therefore, the recommendation is twofold. For companies with a very low financial allocation Botbox was recommended as it fulfilled the conditions in terms of the CI process. For
the companies with medium allocations, Strategy! was recommended, given its potential for single user licensing.

3. Content developers
The content development cluster showed regard for one aspect of the intelligence cycle: analysis. Along with the software support for analysis, the criteria also included two major groups of differing financial capability for investment in CI software, one with a low allocation and the other with a medium allocation. Due to the division of groups based on financial capability, the recommendation for this cluster was also twofold: Brimstone and Strategy! for the companies with low and medium financial allocations respectively.

4. Telecommunications
Like the content development cluster, the telecommunications cluster also showed interest in gaining software support for only one aspect of the intelligence cycle: organisation, storage and retrieval of competitive information. The criterion was minimal with the majority not willing to spend very low to low amounts on CI software. Therefore, Copernic was recommended as it fulfilled these needs.

5. Education and training
The education and training cluster regarded the analysis, development and distribution of CI products phases of the intelligence cycle to be an important aspect to have in a CI software. There was an almost even distribution of companies between those not connected to a server and those which were server-enabled and also between those with a low or those with a medium to high allocation for software. Wincite is very suitable for the companies with high financial allocations as well as server enabled, as the software has a comprehensive analysis, development and distribution of CI products functions. Brimstone is also very suited for companies with low financial allocations and that were not being connected to servers, as it fulfilled the CI process criteria.

6. Hardware and electronics design
The hardware and electronics design cluster regarded the acquisition, organisation, storage and retrieval, analysis, and the development and distribution phases of the intelligence cycle to be
important functions in a CI software. As the majority of SMEs in the cluster are server-enabled, and taking into account their pricing concerns (a fairly even distribution across the sample of SMEs, ranging from low to medium high allocations), it was recommended that the sample with the low to medium financial allocations for CI software might use Brimstone, which is capable of all the functions required. As for the companies with high allocations, it was recommended that they use Factiva, which integrates one of the world's leading business databases with comprehensive CI functionalities.

7. Systems security

The systems security cluster regards the acquisition and the distribution phases of the intelligence cycle as important functions to have in a CI software. With the majority with high system capabilities and system enabled, Copernic is very suitable because it is low priced, a requirement of companies from this cluster.

8. Systems integration

The systems integration cluster considered the analysis and the development and distribution aspects of the intelligence cycle to be important functions in a CI software. As the majority of SMEs in the cluster are server-enabled, and since their financial capabilities ranged fairly evenly across the sample from low to medium to high, the following recommendations were made. Companies with low to medium financial allocations for CI software to use Brimstone, which is capable of all the functions required but with an appropriate price. As for the companies with high allocations, it was recommended that they use LexisNexis, which, similar to Factiva, is another leading online database with analysis and report development and distribution functions.

9. Mobile and wireless technology

Like the education and training SMEs, the mobile and wireless technology SMEs required software that can analyse competitive information, and develop and distribute reports on. This group of companies was also server enabled and their concerns for price were also fairly evenly distributed across the sample of various SMEs, ranging from medium to high to very high
allocations. Therefore, companies with high to very high financial allocations were recommended to use Traction, with comprehensive analysis support capabilities and a state-of-the-art report development and dissemination functions. The remaining companies would appreciate Strategy! with functions exceeding process requirements.

10. Shared Services

Also similar with the previous SMEs, the shared services SMEs also required software that can analyse competitive information, and develop and distribute reports. With an almost even distribution of companies that were not connected to a server and those that were server enabled, and with low to lower medium allocations for CI software, it was recommended that SMEs from this cluster should use Copernic and Brimstone, for the companies with low and lower medium financial allocations respectively. No consideration was given to the server requirements as these companies could only afford the standalone options.

Next Steps
At this point, these recommendations only lack the verification needed to show the reliability of data and findings. The following section, therefore, concludes the chapter by reporting the final part in this stage of the research, which studied the perceptions of prospective CI software users recruited from each SME cluster, on the effectiveness of the software recommended (see the following Table 7.3).
Table 7.3: Summary of software evaluation studies and its comparable fit with SME cluster’s CI requirements

<table>
<thead>
<tr>
<th>CI Process</th>
<th>Strategy</th>
<th>Traction 3.7</th>
<th>Winclite 8.2</th>
<th>Copernic Pro</th>
<th>Botbox PA</th>
<th>Brimstone v.2</th>
<th>Faciva</th>
<th>Lexis Nexis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software developers</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
</tr>
<tr>
<td>Production &amp; design</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
</tr>
<tr>
<td>Content development</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
</tr>
<tr>
<td>Education &amp; training</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
</tr>
<tr>
<td>Hardware/ electronics design</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
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<tr>
<td>Systems Security</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
</tr>
<tr>
<td>Systems Integrating</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
</tr>
<tr>
<td>Mobile / Wireless technology</td>
<td>Functions fulfilled requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions fulfilled requirements</td>
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<tr>
<td>Shared services</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions exceeded requirements</td>
<td>Functions did not fulfill requirements</td>
<td>Functions did not fulfill requirements</td>
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</table>

Systems requirements

<table>
<thead>
<tr>
<th>Software Cluster</th>
<th>Strategy</th>
<th>Traction 3.7</th>
<th>Winclite 8.2</th>
<th>Copernic Pro</th>
<th>Botbox PA</th>
<th>Brimstone v.2</th>
<th>Faciva</th>
<th>Lexis Nexis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software developers</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Internet accessible.</td>
<td>Internet accessible.</td>
</tr>
<tr>
<td>Production &amp; design</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
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<td>Internet accessible.</td>
<td>Internet accessible.</td>
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<tr>
<td>Telecommunications</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
<td>Can install and have sufficient capacity to use.</td>
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<td>Internet accessible.</td>
<td>Internet accessible.</td>
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</table>
### Content development

<table>
<thead>
<tr>
<th>Might have insufficient allocation to install.</th>
<th>Might have insufficient allocation to install.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Internet accessible.</th>
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</table>

### Education & training

<table>
<thead>
<tr>
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<th>Might have insufficient allocation to install.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
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</table>

### Hardware & electronics design

<table>
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<tr>
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<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Internet accessible.</th>
<th>Internet accessible.</th>
</tr>
</thead>
</table>

### Systems Security

<table>
<thead>
<tr>
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<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
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<th>Internet accessible.</th>
<th>Internet accessible.</th>
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</table>

### Systems Integration

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<th>Might have insufficient allocation to install.</th>
<th>Might have insufficient allocation to install.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Internet accessible.</th>
<th>Internet accessible.</th>
</tr>
</thead>
</table>

### Mobile / Wireless technology

<table>
<thead>
<tr>
<th>Might have insufficient allocation to install.</th>
<th>Might have insufficient allocation to install.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Internet accessible.</th>
<th>Internet accessible.</th>
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</table>

### Shared services

<table>
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<th>Might have insufficient allocation to install.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Can install and have sufficient capacity to use.</th>
<th>Internet accessible.</th>
<th>Internet accessible.</th>
</tr>
</thead>
</table>

### Other criteria: Costs and Usability

<table>
<thead>
<tr>
<th>Software</th>
<th>Strategy!</th>
<th>Traction 3.7</th>
<th>WinCite 8.2</th>
<th>Copernic Pro</th>
<th>Botbox PA</th>
<th>Brimstone v.2</th>
<th>Factiva</th>
<th>Lexis Nexis</th>
</tr>
</thead>
</table>

**Software developers**

- Price is a deterrent. Software can be utilised.
- Price, applicability and time are deterrents. Software can be utilised.
- Price is a deterrent. Software is easy to use.
- Affordable. Software can be utilised.
- Affordable. Software did not fulfill requirements.
- Affordable. Software can be utilised.
- Affordable. Software can be utilised.

**Production & design**

- Price might be a deterrent. Software might be underutilised.
- Price, usage and time are deterrents. Software can be installed.
- Price is a deterrent. Software is easy to use.
- Affordable. Software might be underutilised.
- Affordable. Software might be underutilised.
- Affordable. Software might be underutilised.
- Affordable. Software might be underutilised.

**Telecommunications**

- Price and applicability is a deterrent. Software might be underutilised.
- Price and applicability and time are deterrents. Software is easy to use but might be underutilised.
- Price and applicability and time are deterrents. Software is easy to use but might be underutilised.
- Affordable. Software can be utilised.
- Affordable. Software can be utilised.
- Affordable. Software can be utilised.
- Affordable. Software can be utilised.

**Content development**

- Price and usage is a deterrent. Software might be underutilised.
- Price and usage are deterrents. Software might be underutilised.
- Price and usage are deterrents. Software might be underutilised.
- Affordable. Software can be utilised.
- Affordable. Software can be utilised.
- Affordable. Software might be underutilised.
- Affordable. Software can be utilised.
<table>
<thead>
<tr>
<th>Category</th>
<th>Price might be a deterrent. Software can be utilised.</th>
<th>Software can be installed, have sufficient capacity to use but might be underutilised.</th>
<th>Software can be installed, have sufficient capacity to use but might be underutilised.</th>
<th>Affordable. Software might be utilised.</th>
<th>Very affordable. Software might be utilised.</th>
<th>Affordable. Software might be underutilised.</th>
<th>Affordable. Software might be underutilised.</th>
<th>Affordable. Software can be utilised.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education &amp; training</td>
<td>Price and usage is a deterrent. Software might be underutilised.</td>
<td>Price and usage is a deterrent. Software can be installed.</td>
<td>Price and usage is a deterrent. Software can be installed.</td>
<td>Affordable. Software might be utilised.</td>
<td>Very affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software can be utilised.</td>
</tr>
<tr>
<td>Hardware/electronics design</td>
<td>Price and usage is a deterrent. Software might be underutilised.</td>
<td>Price and usage is a deterrent. Software can be installed.</td>
<td>Price and usage is a deterrent. Software can be installed.</td>
<td>Affordable. Software might be utilised.</td>
<td>Very affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software can be utilised.</td>
</tr>
<tr>
<td>Systems Security</td>
<td>Price is a deterrent. Software can be utilised.</td>
<td>Price and time are deterrents. Software can be installed.</td>
<td>Price and time are deterrents. Software can be installed.</td>
<td>Affordable. Software might be utilised.</td>
<td>Very affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software can be utilised.</td>
</tr>
<tr>
<td>Systems Integration</td>
<td>Price and usage is a deterrent. Software might be underutilised.</td>
<td>Price and usage is a deterrent. Software can be installed.</td>
<td>Price and usage is a deterrent. Software can be installed.</td>
<td>Affordable. Software might be utilised.</td>
<td>Very affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software can be utilised.</td>
</tr>
<tr>
<td>Mobile / Wireless technology</td>
<td>Price is a deterrent. Software can be utilised.</td>
<td>Price and time are deterrents. Software can be installed.</td>
<td>Price and time are deterrents. Software can be installed.</td>
<td>Affordable. Software might be utilised.</td>
<td>Very affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software can be utilised.</td>
</tr>
<tr>
<td>Shared services</td>
<td>Price and usage is a deterrent. Software might be underutilised.</td>
<td>Price and usage is a deterrent. Software can be installed.</td>
<td>Price and usage is a deterrent. Software can be installed.</td>
<td>Affordable. Software might be utilised.</td>
<td>Very affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software might be utilised.</td>
<td>Affordable. Software can be utilised.</td>
</tr>
</tbody>
</table>
7.5 Evaluation of Perceived Effectiveness

This part of the chapter reports the final part in the overall research methodology, which constructed a comparatively short methodology to attain a certain level of verification for the results achieved in the first and second stage of the research. Specifically, this section examined the perceptions of users on the effectiveness of the CI software recommended for them in the previous section. The methodology used involved a qualitative study, which employed a 'multiple-constituency' approach to understanding perceived effectiveness, and evaluated the CI software effectiveness as well as the differential evaluations of perceived effectiveness in participating SMEs. This approach allowed the gathering of data from different groups of respondents with different job scopes, specifically the grouping of respondents by level of seniority within each company. The evaluation also reports any implications of overall perceptions of effectiveness in the use of the recommended CI software.

The different constituencies within the participating SMEs were conceptualised by grouping respondents by level of seniority (senior management, middle management, and lower level staff). It was expected that different job scopes would result in differing perceptions of effectiveness of the recommended software. Furthermore, the inclusion of the management level staff is justified because of the differential decision-making authority extended to these management levels in terms of the usage of actionable CI. Although the SMEs were considered the prospective users of the software, the liaising officer at the Multimedia Development Corporation who oversees the SMEs under the Multimedia Super Corridor and a senior manager in the Business Intelligence Department at MDC were also asked to give their views and perceptions of effectiveness on the recommended software.

The evaluation of perceived effectiveness used in the part of the research is based on Davis' Technology Acceptance Model (TAM), which includes two constructs: perceived usefulness and perceived ease-of-use (illustrated above, Figure 7.11)\(^{282}\). Usefulness and ease of use are both believed to be important factors in determining acceptance of software. According to Davis, the scales of both constructs demonstrate a high degree of test-retest reliability. From this platform, these two constructs were thought to be of paramount importance in this study. There is considerable interest in human factors of systems due to the recognition of how poorly designed many current systems are and the wish to produce design and implementation guidelines that foster computer technology acceptance. Therefore, in order to produce proper feedback based on perception of effectiveness, there was a need for the research to facilitate a more complete understanding of the factors contributing to software acceptance.

User acceptance is often the pivotal factor determining the success or failure of software development projects. TAM is used to address why users accept or reject software and how user acceptance is influenced by system characteristics across users perceptions and their attitudes toward the software. Although the two constructs were developed to evaluate software prototypes, the premise where the result of the evaluation is based on the user's acceptance or rejection of software in natural settings was found to be very suitable for evaluating the CI software recommended for the SME clusters. Therefore, the two constructs, perceived usefulness and perceived ease-of-use, as developed by Davis were integrated into the research methodology. The following paragraphs further define the two constructs.

Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his/her job performance"\(^{283}\). The importance of perceived usefulness as an important determinant of user acceptance derives from the TAM model, which proposes that perceived usefulness affects IT usage due to the reinforcement value of outcomes. Davis reported that user acceptance of an IT system is driven to a large extent by perceived usefulness. He also argues that perceived usefulness is the most influential determinant of software usage underscoring the importance of incorporating the appropriate functional capabilities in new systems. Further, positive association between perceived usefulness and software usage has been reported by several other studies\(^{284}285286\).


\(^{283}\) Ibid.

Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of physical and mental efforts.\textsuperscript{287} Davis found that ease of use is an important determinant of system usage operating through perceived usefulness. He also states that the effective functionality of a system, that is, perceived usefulness, depends on its usability, i.e., perceived ease of use. Davis later suggests that perceived ease of use may actually be a prime causal antecedent of perceived usefulness.\textsuperscript{288} TAM also postulates that perceived ease of use is an important determinant of attitude toward using software.

7.5.1 Hypotheses

The two hypotheses stated in Aim 2 of Chapter 1 are reproduced here to inform the analysis. These were as follows:

\begin{quote}
\text{(3) The relationship between different levels of staff and management of the SMEs and the variables of perceived effectiveness

Employees at the senior and middle management and lower level staff from within each SME under study will react differently in terms of the way they perceive the effectiveness of the recommended CI software to their scope of work.}
\end{quote}

The rationale here was based on the argument that respondents from different employee strata are expected to differ in their perceptions of effectiveness for the recommended software for competitive intelligence. For example, those in senior positions may be expected to value aspects of the software that augment strategic decision-making, such as the software's analysis functions. However, the value mostly revolved around the job scope, especially when it is very common for employees in SMEs to hold responsibilities of many or even all levels of seniority. Nevertheless, it was hypothesised that they would hold different views as to the perceived effectiveness of the recommended software for CI.

The relationship between the SME clusters and the variables of perceived effectiveness

Respondents from each industry cluster will react positively towards the recommended CI software.

The rationale for the second hypothesis was based on the contention that a software evaluation study which sets a unique set of criteria based on the purpose, needs and context of the users is most ideal, rather than a standardised evaluation. With the development of the taxonomy of intelligence configuration in the first stage of the research, which was constructed based on the context, structure, and needs of respondents from different industry clusters, followed by recommendations of software for CI based on different CI configurations, it was a natural progression that the research was to go the next step to gain feedback from the industries for a certain level of verification. It was therefore hypothesised that the respondents representing the clusters would react positively to the software recommended to them.

7.5.2 Methodology and Sample Selection

The methodology for analysing the data gathered was incorporated in the following way. To validate the findings of both the first and the second stage of the research, the third stage sought to test the perception of effectiveness of the recommended software to the prospective users representing the respective clusters. The methodology used involved a qualitative study, which employed a 'multiple constituency' approach, and which allowed the gathering of data from different groups of respondents of different job scopes, specifically the grouping of respondents by level of seniority within each company. Initially, the selected respondents were given demonstrations on the software packages intended for them, after which, evaluation sessions were held for the respondents to test the software themselves. The gathering of feedback about the software was initiated using a questionnaire, which consisted mostly of closed-ended questions covering aspects of perceived effectiveness based on Davis' TAM model (The questionnaire used in this study is reproduced in full in Appendix 2, A2.11). It was intended for the methodology for this stage to be a relatively concise study (compared to the methodologies of Stage 1 and Stage 2 of the research) on the reactions of prospective users towards the CI software recommended to each distinct cluster group based on aspects of context, structure, key intelligence needs, and the intelligence cycle.
The number of respondents that participated in this survey totalled to 24, which was a significantly smaller than those analysed in the first stage. As stated in the previous paragraph, even though the questionnaire was mostly made up of closed-ended questions, the research chose a qualitative approach to analysing the gathered data. A quantitative study was not appropriate for the sample of this size, with each group with no more than four respondents, because the sample and group size might not generate statistically significant findings. According to a number of authors, such as Stevens, who argue that if the size of groups is not sufficiently large, n>20 cases per group, advanced statistical tests employed to explore significance of differences may not reveal statistical significance in the findings. This justified the qualitative approach chosen. This approach also allowed for the research to draw conclusions from the perspectives of respondents of different levels within their respecting companies, at the same time, justifying their feedback based on the responsibilities and job scopes relative to CI activities. Additionally, given that close-ended questions are highly structured in nature, the respondents were kept focused on the topics researched. Also in addition to the closed-ended questions, the questionnaire asked the respondents to list the positive and negative aspects of the software, to provide supporting information and perhaps, further clarification to their answers to the closed-ended questions. The answers to these open-ended questions allowed the researcher to further explore the respondents’ acceptance to the software. Additionally, the questionnaire ended with an optional ‘box’ for respondents to give any other comments. The construction of the questionnaire was based on Davis’ constructs of perceived usefulness and perceived ease-of-use, which explored the respondents’ perceptions in the effectiveness in using the recommended software, as well as their views on their abilities to learn and use the software with minimal training.

With regard to data analysis, like in the analysis of the qualitative data in the first stage of the research, an identification of important themes and essential features of the responses was sought. Following Patton, data organisation and interpretation was achieved by a three stage process: 1) data reduction to meaningful and concise points, 2) data display in organised charts or tables reporting responses representative of each SME, and 3) data interpretation where comparisons between SMEs were made, interrelationships among variables identified, and conclusions drawn. Note that, considering the number of participants were relatively small, and that the questions were largely closed ended, the analyses
relating to this part of the research were conducted manually, that is, without the support of NVivo or any qualitative content analysis tool.

The sample of respondents incorporated in this stage of the analysis was selected in the following manner. The respondents were the 24 interview participants from the Stage 1 survey who were liaised with to allow their colleagues and subordinates with varied job scopes to represent their companies and industry clusters. The respondents were selected from within the clusters for further analysis on the basis of variation and of representing cases in each of the clusters where upper management, middle management, and lower level staff or their equivalents were incorporated. By selecting a variation in the sample, it was intended to minimise any possible similarities deriving from the nature of business represented. However, five out of the ten clusters only had two levels of responses instead of three, where the situation was that either upper management was not able to participate, or there were not any middle managers in their company structure.

7.5.3 Operationalisation of Concepts

The questionnaire survey generated data relating to respondents’ perceptions of the recommended software with partial observation by the researcher within the company itself. Therefore, the respondents were able to demonstrate usage behaviour together with comments, which were noted to support the data gathered from the questionnaire. Optionally, they could express their comments in a box prepared at the end of the questionnaire. The investigated variables pertaining to perception of effectiveness included the following:

1) **Perceived usefulness**

Six elements of perceived usefulness provided the focus for this element of the questionnaire:

- ability to accomplish tasks related to competitive intelligence
- effect of job performance
- effect on productivity
- work effectiveness
- work efficiency and
- overall usefulness.

2) **Perceived ease-of-use**

The information sought in respect of this variable related to:
3) Perceived disadvantages of the software
This area of questioning sought to establish negative aspects of the software.

4) Perceived advantages of the software
This area of questioning sought to establish positive aspects of the software.

7.5.4 Findings – Perceived effectiveness of every participant (representing each Cluster) towards recommended CI software

Twenty-four respondents gave their views on the effectiveness of the recommended CI software. Tables 7.4a, 7.4b, and 7.4c summarise the questionnaire results for every participant. As discussed in Chapter 6, although the clusters were considered groups with similar characteristics in terms of CI approaches, they can still be further divided in terms of financial allocations for purchasing software for CI. Therefore, more than one software package was recommended in an attempt to meet the requirements of these sub-groups. Additionally, it should be noted that parts of the table were left blank, imitating the parts in the questionnaire that was left unanswered by the respondents.
Table 7.4a: Overview of findings on the perceived effectiveness of recommended CI software for users in SMEs

<table>
<thead>
<tr>
<th>Perceived Effectiveness</th>
<th>Cluster Variables</th>
<th>Software developers (Brimstone)</th>
<th>Production &amp; design (Bottox - B &amp; Strategy - S)</th>
<th>Telecommunications (Brimstone - B &amp; Strategy - S)</th>
<th>Content development (Copernic)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Manager</td>
<td>Line staff</td>
<td>Manager</td>
<td>Line staff</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness:</td>
<td>Ability to accomplish CI tasks</td>
<td>Neutral</td>
<td>Fairly useful</td>
<td>B: Fairly useful</td>
<td>S: Very useful</td>
</tr>
<tr>
<td></td>
<td>Effect on productivity</td>
<td>Fairly useful</td>
<td>Fairly useful</td>
<td>B: Fairly useful</td>
<td>S: Very useful</td>
</tr>
<tr>
<td></td>
<td>Overall usefulness</td>
<td>Fairly useful</td>
<td>Fairly useful</td>
<td>B: Fairly useful</td>
<td>S: Very useful</td>
</tr>
<tr>
<td>Perceived ease-of-use:</td>
<td>Learn to use software</td>
<td>Fairly easy</td>
<td>Fairly difficult</td>
<td>B: very easy</td>
<td>S: very difficult</td>
</tr>
<tr>
<td></td>
<td>Able to do what is intended by user</td>
<td>Fairly easy</td>
<td>Fairly difficult</td>
<td>B: easy</td>
<td>S: difficult</td>
</tr>
<tr>
<td></td>
<td>Understandability of functions</td>
<td>Fairly easy</td>
<td>Fairly difficult</td>
<td>B: easy</td>
<td>S: difficult</td>
</tr>
<tr>
<td></td>
<td>Flexibility</td>
<td>Fairly easy</td>
<td>Fairly difficult</td>
<td>B: easy</td>
<td>S: difficult</td>
</tr>
<tr>
<td></td>
<td>Protocols for users to be skillful</td>
<td>Fairly easy</td>
<td>Fairly difficult</td>
<td>B: easy</td>
<td>S: difficult</td>
</tr>
<tr>
<td></td>
<td>Overall ease-of-use</td>
<td>Fairly easy</td>
<td>Fairly difficult</td>
<td>B: easy</td>
<td>S: difficult</td>
</tr>
<tr>
<td>Negative aspects:</td>
<td>- No links to information sources</td>
<td>Manual</td>
<td>- Not connected to Internet</td>
<td>B: Not worth the price - Doesn’t do much</td>
<td>B: Not connected to Internet</td>
</tr>
<tr>
<td>Positive aspects:</td>
<td>- Effective use of categories</td>
<td>- Able to customise</td>
<td>- Intuitive</td>
<td>- Record of activities</td>
<td>- B: Useful for detecting Web changes</td>
</tr>
<tr>
<td></td>
<td>- Report capabilities</td>
<td>- Ability to customise</td>
<td>- Intuitive</td>
<td>- Record of activities</td>
<td>- B: Analysis</td>
</tr>
<tr>
<td></td>
<td>- Need more time for review</td>
<td>- S: not tested in context</td>
<td>- S: not tested in context</td>
<td>- B: - Expensive</td>
<td>- S: - Many functions to understand</td>
</tr>
<tr>
<td></td>
<td>- Not enough time to test</td>
<td>- Too little time to evaluate</td>
<td>- Hard to use</td>
<td>- Not enough time to learn</td>
<td>- Need more time to learn</td>
</tr>
</tbody>
</table>

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## Table 7.4b: Overview of findings on the perceived effectiveness of recommended CI software for users in SMEs

<table>
<thead>
<tr>
<th>Perceived Effectiveness</th>
<th>Perception of Effectiveness</th>
<th>Education and training (Wince I-W &amp; Brimstone-B)</th>
<th>Hardware and electronics design (Brimstone - B &amp; Factiva - F)</th>
<th>Systems security (Coperonic)</th>
<th>Systems integration (Brimstone - B &amp; LexisNexis - L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived usefulness:</td>
<td></td>
<td>Manager</td>
<td>Upper Mgmt</td>
<td>Line staff</td>
<td>Manager</td>
</tr>
<tr>
<td>Ability to accomplish CI tasks</td>
<td></td>
<td>Fairly useful</td>
<td>Fairly useful</td>
<td>Neutral</td>
<td>Fairly useful</td>
</tr>
<tr>
<td>Effect of job performance</td>
<td></td>
<td>Very useful</td>
<td>Very useful</td>
<td>Neutral</td>
<td>Very useful</td>
</tr>
<tr>
<td>Effect on productivity</td>
<td></td>
<td>Very useful</td>
<td>Very useful</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Work effectiveness</td>
<td></td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Work efficiency</td>
<td></td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Overall usefulness</td>
<td></td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Perceived ease-of-use:</td>
<td></td>
<td>Fairly easy</td>
<td>Fairly easy</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Learn to use software</td>
<td></td>
<td>Very easy</td>
<td>Very easy</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Ability to do what is intended by users</td>
<td></td>
<td>Very easy</td>
<td>Very easy</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Understandability of functions</td>
<td></td>
<td>Very easy</td>
<td>Very easy</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Flexibility</td>
<td></td>
<td>Very easy</td>
<td>Very easy</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Prospects for users to be skilled</td>
<td></td>
<td>Very easy</td>
<td>Very easy</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Overall ease-of-use</td>
<td></td>
<td>Very easy</td>
<td>Very easy</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Negative aspects</td>
<td></td>
<td>Not able to search the Internet</td>
<td>Not able to search the Internet</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Positive aspects</td>
<td></td>
<td>Not enough time to test</td>
<td>Not enough time to test</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Optimal comments</td>
<td></td>
<td>Not enough time for Factiva</td>
<td>Not enough time for Factiva</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>
Table 7.4c: Overview of findings on the perceived effectiveness of recommended CI software for users in SMEs

<table>
<thead>
<tr>
<th>Perceived usefulness:</th>
<th>Mobile and wireless technology (Traction - T &amp; Strategy - S)</th>
<th>Shared Services (Coppell - C &amp; Brimstone - B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to accomplish CI tasks</td>
<td>Upper Mgmt</td>
<td>Manager</td>
</tr>
<tr>
<td>Effect on productivity</td>
<td>T: Fairly useful S: Very useful</td>
<td>T: neutral B: Fairly useful B: Neutral</td>
</tr>
<tr>
<td>Work effectiveness</td>
<td>T: Fairly useful S: Very useful</td>
<td>T: neutral B: Fairly useful B: Neutral</td>
</tr>
<tr>
<td>Work efficiency</td>
<td>T: Fairly useful S: Very useful</td>
<td>T: neutral B: Fairly useful B: Neutral</td>
</tr>
<tr>
<td>Overall usefulness</td>
<td>T: Fairly useful S: Very useful</td>
<td>T: neutral B: Fairly useful B: Neutral</td>
</tr>
<tr>
<td>Negative aspects</td>
<td>T: difficult to use S: difficult to use</td>
<td>T: confusing S: hard to learn and confusing C: Reporting functions</td>
</tr>
<tr>
<td>Positive aspects</td>
<td>T: Instant Publisher S: IntoAction</td>
<td>T: Publishing function T: default categories and customisation S: Compatibility C: - selection of search engines</td>
</tr>
<tr>
<td>Optional comments</td>
<td>Need more time to get used to</td>
<td>Not enough time to test</td>
</tr>
</tbody>
</table>

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Chapter 8
Conclusions

8.1 Introduction

The role of this chapter is threefold:

a) a discussion of the implications on the Aims and Objectives of the research,

b) a discussion of the contribution of the research and the principal findings of the two empirical stages, and

c) an acknowledgement of the limitations of the project and discuss the implications for future work.

8.2 Implications to the Aims and Objectives of the Research Project

This section related the findings and conclusions directly to the Aims and Objectives of the research as first described in Chapter 1 of the dissertation.

The findings gathered from the questionnaire and interview led to several conclusions as regards the five objectives of Aim 1 reproduced:

1. To define the structures and contexts or environments within which SMEs operate.

2. To define the SMEs' key intelligence needs in terms of strategic actions, technology planning and decisions, and specific competitors.

3. To define the SMEs' software preferences based on the six phases of the Intelligence Cycle.

4. To identify homogeneity amongst the companies in terms of the preferences in the different phases of the Intelligence Cycle, their key intelligence needs and their structural and contextual features by way of cluster analysis.

5. To determine the relationships between the clusters of companies and construct a taxonomy of competitive intelligence configurations derived from the companies' relationships with the Intelligence Cycle, their structural and environmental characteristics, and key intelligence needs of SMEs.
Based on the above objectives, a number of tasks were addressed for this stage of the research. The first was to identify structural and contextual characteristics of Malaysian SMEs in the ICT sector. The cluster analysis undertaken to provide the basis in structuring the taxonomy of SMEs was able to identify the structures in the sample, and to categorise by industry clusters. Ten types of configurations of structure, context, and the intelligence cycle elements were defined, some of which resembled Mintzberg's 'ideal' types of entrepreneurial and ad hoc structures. By being able to categorise the SMEs by the value they placed in the aspects of the Intelligence Cycle, and how it relates to structure and context, it was possible to observe patterns within different types of Malaysia ICT SMEs with different structural and contextual characteristics.

Secondly, the need to derive key intelligence needs in terms of strategic decisions and actions, early-warning planning, and key players was addressed. This aspect was put to perspective and highlighted in the analysis of qualitative data gathered from the interviews of 12 management staff. Detailed accounts of each cluster were discussed for the purpose of providing sufficient understanding of the competitive environment for each sub-industry in the ICT sector in Malaysia.

Thirdly, as SMEs have always been on the deprived end in terms of monetary capital and financial resources, it was important to establish whether availability of resources played a role in the differences in structure, context, and values placed in the aspects of the intelligence process in SMEs. The relationships between the companies' resource accessibility (turnover) and all other variables were analysed for each cluster. The results indicated that access to financial resources did not necessarily have a significant impact on the business processes and activities in the Malaysian SME. Taking one of the clusters to illustrate this point, the correlations showed that the companies in the telecommunications cluster had low complexity levels of resource accessibility, but showed evidence of dynamic research activities. However, the production and design cluster were consonant with what was anticipated, that is, low levels of resource accessibility would result in low levels of competitive research capabilities, such as lack of proper software tools to manage competitive information.

Fourthly, with access to information had been one of the main incentives, there was a need to identify current intelligence specific tasks of SMEs in terms of gathering and organising competitive information, which then further raised a sub-question of whether there were differences in the tasks between structures and contexts of these companies. The main question was answered from the analysis conducted in
answering the first question informing the research, where the values placed in the six aspects of the CI process were derived. The sub-question also picked up from the first question, where it could be concluded that the tasks related to the CI process were configured differently between structures and contexts.

Fifthly, this phase of the research was required to produce a taxonomy of configurations, which identified the relationships between each identifiable structure and context of these SMEs in terms of specific CI tasks and their intelligence needs. The taxonomy was achieved and illustrated in detail (Table 6.6) in Chapter 6 of the dissertation.

In addition to fulfilling the objectives of the research, the key observation that emerged after completing the analysis for the first phase of the research was that there was a fairly strong fit between the structural characteristics, and the software values for the six aspects of the intelligence process. In effect, the qualitative data derived from the interviews relating to key intelligence needs ‘fleshed’ out the details of SME activity to go with the ‘bones’ of structural and CI process details provided by the cluster analysis, and this indirectly confirmed the strength of the research analysis.

Following the completion of stage one of the research project, the second stage utilised these findings in the development of a comprehensive software evaluation frameworks based on the developed taxonomy. The frameworks were then used to construct the evaluation criteria used in the evaluation of CI software that follow. The evaluation was concluded with a feedback study, which examined the perceptions of users on the effectiveness of the software recommendations made for them. The findings gathered from both the software evaluation and the perceived effectiveness study lead to a number of conclusions as regards the eight research objectives of Aim 2 reproduced below:

1. To identify the range of CI software packages that is suitable for SMEs.
2. To define the features and functions of the selected CI software.
3. To identify the capabilities of the selected CI software in adding value to the six phases of the Intelligence Cycle.
4. To identify and evaluate the relationships between the software functions with the boundaries and requirements of SMEs identified within the competitive intelligence configurations taxonomy.
5. To make recommendations on suitable CI software packages based on the structures, contexts, key intelligence needs, and focuses on the Intelligence Cycle of each SME group or cluster.
6. To test the overall perceived effectiveness of the recommended CI software packages to prospective users that represent each SME group or cluster.

7. To identify the differences in perceptions of effectiveness between prospective users of different levels or job scopes.

8. To validate the consistency of the overall findings of the research based on the respondents' perceived effectiveness of CI software.

The above objectives for Aim 2 of the research acted as an outline to achieve the overall aim, which was to evaluate and test the CI software and online tools for SMEs. Therefore, the following paragraphs summarise the steps taken in achieving the said aim.

The process of filtering and selecting off-the-shelf CI software fulfilled the first three objectives of Aim 2, which was to identify the range of CI software, to define its features and functions and how they add value to the intelligence cycle, which was used as the basis for the selection process. In identifying the range of CI software, the selection process began by searching the Internet to gain preliminary information on off-the-shelf CI software products. The information gathered enabled the compilation of a list of products that proclaim to support the CI function. Some of the products were packaged as 'business intelligence' products, but all were disregarded, as they were mainly number crunching software, which closely relate to data warehousing and quantitative analysis. Additionally, business intelligence software that went through the preliminary filtering process was more to do with integration of internal information management, rather than the management of external information. As more information on CI applications was gathered, the review process included many in-person and online product demonstrations, as well as vendor-produced training sessions.

As further selections were made, more in-depth information was gathered about the range of software, such as types of CI software, technological requirements for installation, trends and price range. A general assumption is that most limitations of SMEs is due to lack of funds, hence, the prices of some of the products were a concern. Also, the higher priced CI software also came with a rather large list of technical requirements, which are not likely to exist within many SMEs. This being an evaluation study for software to be used in a small and medium-sized enterprise, the concern heightened as to whether or not to disregard more expensive and elaborate applications at this stage of the selection process. In addition to this problem, a recent development had shown that CI applications were moving to be accessible online,
where the features and functions were integrated with sources on the Internet and users will have the option of using the online server rather than having one in-house. Former standalone applications, such as Brimstone Intelligence, have introduced a Web-based product. Therefore, this gave the opportunity for other online information tools to be evaluated, such as Factiva, which promoted itself as functioning like CI software, provided it passed the preliminary requirements as a CI software tool. Prices for the new types of applications were still on the higher end, but not as high as the server-based applications. In terms of function and features, however, they all provided support that was based on a version of the Intelligence Cycle. The decision was, therefore, made to include applications of all types, as long as they fulfilled the requirement of the intelligence cycle being the basis of construction. In consideration of the financial situation for most SMEs, additional emphasis was placed on finding lower cost applications for CI to be evaluated.

In identifying and evaluating the selected CI software, the needs and requirements on the ten clusters of SMEs was extracted from the taxonomy of CI configurations for SMEs to develop the evaluation frameworks and criteria. Due to the conclusions made during the CI software selection process, the evaluation generally concluded that the structure and context, and the approach to CI heavily influenced the type of CI software, as different software add value to and support different parts of the CI process. This, in turn, set the stage for the fifth objective of Aim 2, which was to recommend suitable software to each cluster of SMEs, based on the their intelligence needs, the phase(s) in the intelligence cycle that need software support, and various structures and contexts. The recommendations concluded that the research was able to match the appropriate software that add value to the CI approaches and needs of SMEs of different sub-industry clusters.

The last three objectives for Aim 2 pertained to the evaluation of perceived effectiveness of the CI software recommended to them. The purpose of the evaluation study was primarily to verify the results of the software evaluation and thus, the methodology used in the research. In testing the overall perceived effectiveness of the recommended software against prospective users representing each cluster, it can be concluded that the findings found varied responses as to how the respondents perceive on the effectiveness of the software that were recommended to them. Although some recommendations were consistent with the perceptions reported in the findings, many were not due to various reasons stated in the findings section of this chapter. In identifying the differences in perceptions of respondents of various levels and job scopes, it can also be concluded that the perceptions of different employees with different
job scopes perceive the recommended software differently in terms of effectiveness, usefulness and ease-of-use. As for verifying the consistency of the overall research, it can be concluded that the overall research findings can only be partially verified based on the perceived effectiveness study. However, the lack of consistency in the findings was not due to the differences in outcomes in terms of the variables under study, but, according to many of the respondents, it was because of the lack of time needed to achieve conclusive results for the purpose of verification. Therefore, although the perceived effectiveness study was able to gather only partially conclusive evidence for verification purposes, tests that covered internal and external validity and reliability, which was conducted earlier in the research, supported the overall approach to be sufficiently verified.

8.3 Original Contributions of Knowledge from this Study

The research project consisted of two stages, which sought to investigate software for competitive intelligence for use in small and medium-sized enterprises in Malaysia. Specifically, the two empirical stages provided the following:

- investigation of the structural and environmental characteristics of selected SMEs in Malaysia, and their intelligence needs in order to establish a taxonomy of “intelligence configurations” for SMEs.
- an evaluation of CI software packages that are accessible to SMEs within these intelligence configurations, and an analysis of the effectiveness of CI software, and differential evaluations of effectiveness (levels of effectiveness) among different users or levels of users within the companies.

The following paragraphs outlines the contributions made from this research project:

1. The Taxonomy

The thesis research strategy was founded on Ben Gilad’s perspectives on Henry Mintzberg’s classic analysis of organisational configurations. This foundation brought the research to the first stage which sought to consider whether any distinction could be made between the SME structures and processes in terms of practices relating to the competitive intelligence concept. Furthermore, a taxonomy of SMEs was derived exploring their structural and contextual
configurations that exist within the SMEs of Malaysia, and its relations to Key Intelligence Topics and the Intelligence Cycle. The cluster analysis undertaken gave evidence of a variety of structures in the sample, and the question of whether CI-related practices could be the axis for which SMEs are categorised by sub-industry clusters was then addressed. Ten types of sub-industry cluster groups were found grouped together, providing evidence that, in terms of CI practices, the SMEs under study showed relative homogeneity. With the taxonomy, prospective users of CI software, as well as practitioners looking to develop a CI programme for a company, are able to refer to the configurations in the taxonomy to give a detailed overview on the structure, context, key intelligence needs and their technological preferences towards the intelligence cycle in Malaysia.

2. Evaluation of CI Software

The second research stage sought to evaluate eight software packages, where five of which were either fully or partially packaged as a tool for competitive intelligence, and the remaining three were not considered as CI tools but were thought to add value to the practice of CI. The analysis of the software was based on the needs and requirements on the ten clusters from the taxonomy developed in the first stage. This approach was itself a unique contribution as other studies of software for CI evaluated the level of automation provided by the application to the intelligence cycle. In other words, the scores given for the evaluated software reflected how comprehensively the product assisted in every phase of the CI process, which this research has established to be ineffective because the context of CI practice was not taken into account on those previous studies. The research argument was that, although studying the various technical features of CI software is important, and not ignored in this study, if however these features were not assessed in the light of the value they added to a particular approach to CI, the assessment would not help users to determine whether a software application was useful for their CI function. This research improved the evaluation process of CI software in this aspect. In addition, the study made recommendations based on the list of evaluated CI software with features and functions that showed suitability to the configurations of the taxonomy.

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3. **Perceived Effectiveness Evaluation of CI Software**

The effectiveness study, discussed in the later sections of this Chapter 7, was to gain feedback on the effectiveness of the recommended software to the related practices of different users within companies representing each cluster. The question of whether there were perceptions of possible improvements in their CI practices was also discussed. Results of the analysis showed that, although some of the respondents gave positive perceptions of the software selected for them, most showed very limited to negative responses towards possible improvements in their approach to CI related tasks by using the software recommended to them. However, their casual reactions showed that most of the respondents were not given enough time to experience the software in a real working environment, and in this respect the research was flawed by the limited resources available. In effect, the unsatisfactory results gained from this stage of the research were not the question of the dependability of the first stage’s taxonomy and the second stage’s software evaluation, but the lack of time. However, due to the time constraints, this part of the thesis contributes (albeit ‘negatively) to knowledge in the sense that it provides little evidence of perceived effectiveness of the CI software recommended to them based on the evaluation.

4. **Origins of CI historical and evolutionary timeline**

In addition to the contributions made through the research methodology, the literature study also made a minor contribution to the CI field. For the purpose of understanding the concept of CI in its entirety, the research reached beyond the CI literature to historical publications of intelligence practices relative to business and commerce. The information gathered was placed in perspective to form a section in the literature review about the ‘origins of competitive intelligence’. In this section, the historical incidents were arranged in a timeline of historical events that showed the evolution of practices towards the complex concept it is known today. It was later found that there had never been a comprehensive study on CI’s origins before.

5. **Scholarly Publications Derived from the Study**

These contributions listed above were further validated through presentations and publications in the fields of competitive intelligence, library and information science and business. In the early
parts of the research, the preliminary gathering of literature were put together to present an overview of the concept of CI as at a seminar at Ipswich held by the Chartered Institute of Library and Information Professionals (CILIP) and was published in CILIP's quarterly journal, *Refer* in 2003. Following the initial literature study, further research on the origins of CI was well-received at the Annual 2006 SCIP conference held in Orlando, Florida, on this occasion, the history of CI being employed as a pedagogical tool to the introduction of CI in an academic setting. This was followed by an article in the *Journal of Competitive Intelligence and Management (JCIM)*, detailing the timeline of events related to CI. Due to positive feedback about the timeline, a website was developed exclusively dedicated to the further developments of the *Origins* timeline. The findings for covering Aim 1 of the research's Aims and Objectives were presented at the 15th BOBCATSSS Symposium 2007. This was based on the findings of the first stage and, partially, the second stage of the research, covering aspects of the taxonomy and the software evaluation. Another publication on the role of information technology for competitive intelligence in small and medium-sized enterprises was presented at the *International Conference on Business and Management 2008* held in Brunei. The most recent paper introduced the Taxonomy of CI Software Configurations for MSC-Status SMEs in Malaysia, which was arguably the most important contribution of this PhD research, was presented at a 2009 SCIP conference held in Chicago, Illinois.


8.4 Limitations of the Study and Implications of Future Work

The review of the entire research project, its constituent empirical stages, and the research findings, enabled a critical evaluation of the rationale of the study. Such an overview of the research strategy also assists in the identification of weaknesses and/or limitations.

A general weakness was that SMEs, like most SMEs in any one sector, differ in their approaches to business, therefore, it was very likely that aspects of measurement and operationalised variables were affected in consequence. Regarding the first empirical stage, one weakness was that, the research design provided a snapshot of the SMEs in terms of structure, context, their views of the intelligence cycle, and their key intelligence needs but fell short in its capacity to evaluate the transitions to these variables over time. Another limitation lay in the ten industry clusters categorised in the taxonomy, where a single snapshot of the list of SMEs within each cluster would invariably incorporate some companies which were not part of the cluster. These anomalies exist possibly because of the differences in their approach to CI related activities compared to other companies from the same industry; or, perhaps, these companies were subsidiary companies of large multinational companies, where CI practices were based on large company CI; or being a subsidiary company, they may not have been in the practice of conducting any CI-related activity. Another weakness relating to this part of the study that is worthy of note was on the approach used to divide the sample into homogenous groups, which may have been better served to some extent by using the more universal Standard Industrial Classification or SIC codes. SIC codes could also have produced significantly different results, which may have affected the outcome of the empirical research. However, the current method of cluster analysis, although harder to execute (field research and industry engagement) was chosen because of a slight influence it has over SIC codes. Cluster analysis is used produce results that considers the relationships between individual companies; not just in finding homogeneity, but the possibility to look into embedded issues between companies, such as competitiveness, shared input needs, and interrelationships with suppliers and buyers – which, due the context of the research with a focus on SMEs existing and competing within the same geographic precincts, brought the researcher to make this decision, with a rather significant sacrifice that SIC codes may have provided for a more accurate outcome.

The second part of the first stage, which involved the interviews of respondents on key intelligence needs, focused on the respondents' explanations of three main aspects of Key Intelligence Topics: a) business
decisions and strategic topics, b) early warning topics, and c) key players. The researcher recognises that
the input gathered and analyses represent only one to two views of 'SME reality'. In addition, the
investigation at this part of Stage 1 was limited to twelve cases. The SMEs having been clustered in
homogenous groups, companies were selected from within these clusters for further, more detailed
analysis on the basis of variation and of representing cases in each of the clusters where a range of
companies was to be incorporated. By incorporating variation in the sample, it was intended to minimise
any organisational similarities deriving from the similar nature that was within each cluster. However, the
volume of the research task meant that representatives from only one to two companies from each cluster
were able to give their input that was used as a representation of each cluster.

The second research stage involved the evaluation of CI software based on the taxonomy developed in
Stage 1. The taxonomy provided the criteria for the evaluation, where each configuration was divided into
two general sections - the intelligence cycle, where the phases conform to the needs of each cluster - and
other general criteria, which included supporting information for evaluation gathered from the
questionnaire survey, technical and financial restrictions, and information and criteria for simulation
based on their respective key intelligence needs. The simulation was a crucial aspect of the evaluation as
it tested the software based on how it would have been used in a real situation. This led to the limitation
of this part of the research, where the alternative approach was to involve the practitioner during the
evaluation process, which would invariably bring to light other evaluation factors that were not
considered. However, the approach of having a practitioner from every SME cluster to participate in the
simulation was too time consuming, given the limited means of the researcher. Nevertheless, the
researcher being the evaluator played a role in putting the evaluation into perspective with regard to the
research goals.

The evaluation study concluded with recommendations of CI software that were suitable for each
configuration of SMEs. For further validation, a feedback study aimed to investigate the effectiveness of
the recommended software in the execution of CI tasks as perceived by prospective users of different job
scopes representing each SME cluster. One limitation echoes the limitation from the interview approach
of Stage 1, where each group of participants was taken from one company to represent their respective
cluster. However, the decision to use this approach for both occasions was based on the results of the
questionnaire data analyses in Stage 1, which showed that each cluster showed homogeneity in terms of
their CI tasks. This allowed the assumption that one company's approach to using the software in terms of
CI-related tasks, such as gathering and management of information sources, uses of product information and information on industry stakeholders, and other aspects of the competitive environment, would be relatively similar to other companies of the same cluster. The other limitation regards the limited time factor, which was mentioned in the Contributions (Section 8.3) section of the chapter. Due to the limited time given for the participants to try the software, a methodology was devised that was able to gather and analyse only the perception of effectiveness in using the recommended software for every cluster. However, this led to partially inconclusive feedbacks mostly due to reasons pertaining to time limitations, such as the need for more time to familiarise with the software and not getting to try all the functions of the software.

The above discussion of the limitations of the research project assists the consideration of the implications of the study, for future work. Further research might include:

- a longitudinal review of structural and contextual characteristics, their views of the intelligence cycle, and their key intelligence needs over a period of two to three years, to observe changes and evolution in CI practices within each business and industry and its effects;
- a strengthening of the qualitative data on key intelligence needs by having a larger sample for each clustered group, which would give a more inclusive representation of the industry in research;
- a more exclusive assessment of perception of effectiveness of CI software for prospective users in SMEs, by devising a methodology that will produce more comprehensive results;
- a continued study on the origins of CI, where as the number of gathered historical events would eventually become larger, the study could then be categorised and further initiated by country or region. Although this study began as a by-product of this research project, the researcher strongly believes that a field with a strong hold on its history and origins possess a more complete understanding of its applications, as well as justification of its existence and future innovations;
- a more focused assessment by way of case studies of companies that are using CI software and, perhaps, conduct a comparative study of before and after scenarios;
- in directly relating to the field of library and information science, aspects of information retrieval may be used as the basis for evaluating the searching capabilities of CI software functions, covering aspects of relevancy and precision and recall, among others;
- on a more technical side, another evaluation study of CI software may be used as the basis towards a construction of a prototype software for CI, perhaps using concepts developed from a
software engineering perspective, for example, Bernard Wong’s Software Evaluation Framework (SEF)299.

In addition to the possible future work relating to improving this research, the analysis of SMEs in terms of structure, context and CI processes and needs, conducted in the first stage of this study, could be used for comparative purposes, in other countries. The differences in CI related concepts across other regions need to be further investigated, as the current developments in conceptual CI have been more from the US, Canada, Britain, Australia, South Africa, Sweden, Finland and other European countries.

Considering the limitations and the list of possible improvements that can be made to this research, an additional consideration of the research reported in this thesis concerns the incorporation of a much bigger sample of SMEs in subsequent researches, re-integrating a more enhanced methodology for all three stages. By using a better devised approach based on previous shortcomings, more significant results could be expected, such as a more defined and exclusive SME groups and better ‘fit’ with variables relating to CI processes and needs. Subsequent stages of the research might also be better tested. This implies that a more complex clustering procedure on the basis of other additional factors, which may include strategic factors and aspects of operations, would have to be performed in order to identify more ‘defined’ cluster groups in the SME world. It is felt however, that having to eliminate the methodological problems experienced during this research project and redoing the research might not reveal significantly better performance and outcomes. It can be argued that research makes progress mainly by showing some hypotheses to be incorrect; and more dependable progress comes from eliminating poor hypotheses than from sustaining plausible but untested hypotheses.

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APPENDIX 1

QUESTIONNAIRE STRUCTURE AND STATISTICAL ANALYSIS, AND INTERVIEW STRUCTURE AND DATA SAMPLE OF ICT SMEs IN MALAYSIA

A1.1 Questionnaire Used in Stage 1 to Investigate the SMEs’ Structures and Contexts, Perspectives on the Intelligence Cycle, and Software Requirements

Questionnaire
RESEARCH SURVEY TITLE (Code: CIQ)
Competitive Intelligence (CI) for Small and Medium-Size Enterprises (SMEs) in Malaysia (Part 1)

RESEARCHER
Mr. A.S. Juhari
Department of Information Science, Loughborough University

Competitive intelligence (CI) is a systematic and ethical process for gathering, analysing, and applying information about the capabilities, vulnerabilities, and the intentions of competitors, and monitoring developments within the overall competitive environment. In augmenting the CI process within companies, software companies have emerged to especially develop software tools that would enhance the CI process and the value competitive intelligence brings to companies. However, there are many uncertainties in the usability of CI software, especially for small and medium-size enterprises (SMEs).

This questionnaire aims to investigate small and medium-size enterprises in Malaysia in the context of managing competitive intelligence. The information gathered from this survey will be used for an extensive evaluation study of CI software aimed for usage in SMEs. Therefore, I am very grateful for your participation, and hope that the results would enhance the capabilities of small and medium-size enterprises in monitoring competition. The results of this research will be in the form of a PhD dissertation for the Department of Information Science, Loughborough University, UK.

The information that you provide will be treated with the greatest care, in order to protect you and the company. No names of individuals, companies or products will be published. However, I may need to contact you again for further clarification of your answers and/or for demonstrations of CI software products to gain feedback, which may be necessary. Also, participants will be able to obtain the results of the research, if these would be of interest.

Should you wish to contact me, please use the following address and/or e-mail.

Address,
Ariff Syah Juhari, Ph.D. Candidate
Department of Information Science,
Loughborough University,
Leicestershire LE11 3TU,
United Kingdom

E-mail: a.s.juhari@lboro.ac.uk

THANK YOU FOR YOUR PARTICIPATION

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INSTRUCTION: Please tick (✓) in the relevant box and state answer where needed.

SECTION A - BACKGROUND INFORMATION

1. Which of these groups would your company be categorised as? Please tick (✓) all that apply.

- Software developers / Business applications service providers
- Content development
- Systems security
- Shared services
- Event management
- Production (Postproduction / animation / graphic design)
- Education & training
- Systems integration
- Law
- Advertising
- Telecommunications
- Hardware/electronics design
- Mobile/wireless technology
- Architectural
- Travel

2. How many people are currently employed in the company?

- Between 1 and 20 people
- Between 21 and 40 people
- Between 41 and 60 people
- Between 61 and 80 people
- Between 81 and 100 people
- Between 101 and 150 people
- Between 151 and 200 people

3. Are job scopes or divisions in your company clearly defined?

- Highly defined and specialised
- Somewhat defined and some specialisation
- Somewhat loose, with moderate inter reliance and moderate multi-tasking
- Very loose, with blurring of job scopes

4. How prevalent is technology in your company?

- All levels of employment have access to technology platforms
- Most employees have access to technology platforms
- Only employees with relevant job scopes have access to technology platforms
- There is no technology platform in the company

5. Your average annual turnover (Ringgit Malaysia) is:

- Less than 1 million
- Between 1 million and 5 million
- Between 6 million and 10 million
- Between 11 million and 15 million
- Between 16 million and 20 million
- Between 21 million and 25 million
- Between 26 million and 30 million
- Between 31 million and 50 million
- Between 51 million and 100 million
- Between 101 million and 500 million
- Over 500 million

6. Do you conduct any type of research or initiative about your industry and/or competitive environment?

- All of the time
- Most of the time
- Depended on project or need
- Not often
- Annually
- Hardly ever

SECTION B - IDENTIFICATION OF CI NEEDS

1. How important are the following competitor's information to your company?

<table>
<thead>
<tr>
<th>Information</th>
<th>Not Important</th>
<th>Not Very Important</th>
<th>Neutral</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Financial situation</td>
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<tr>
<td>b. Sales and market share</td>
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<td></td>
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<tr>
<td>c. Decisions and actions</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>d. Product(s) and service(s)</td>
<td></td>
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<tr>
<td>e. New development(s)</td>
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<tr>
<td>f. Prices/ pricing structures</td>
<td></td>
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<tr>
<td>g. Government regulations and court rulings</td>
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</tr>
<tr>
<td>h. Suppliers and subcontractors</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>i. Others (please state):</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

2. Do you think that it would be useful to have software that would help highlight areas of greater relevance to your company's unique needs and environment?

- Very useful
- Somewhat useful
- Slightly useful
- Not useful at all
- Not able to say

SECTION C - ACQUISITION OF COMPETITIVE INFORMATION

1. Where does your company obtain information about competitors? Please choose all that apply.

260
2. Please rate the importance of each phase in acquiring information.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Not Important</th>
<th>Not Very Important</th>
<th>Neutral</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Identification of external/internal information sources</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>b. Monitoring content within information sources</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>c. Filtering information content</td>
<td></td>
<td></td>
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<tr>
<td>d. Alerting of information</td>
<td></td>
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<tr>
<td>e. Importation of information</td>
<td></td>
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<tr>
<td>f. Screening of information</td>
<td></td>
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</tr>
<tr>
<td>g. Rating of information</td>
<td></td>
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<td></td>
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<tr>
<td>h. Ethical acquisition of information</td>
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<td></td>
</tr>
</tbody>
</table>

3. Would software or technology to acquire the competitive information be useful?

<table>
<thead>
<tr>
<th>Usefulness</th>
<th>Very useful</th>
<th>Somewhat useful</th>
<th>Slightly useful</th>
<th>Not useful at all</th>
<th>Not able to say</th>
</tr>
</thead>
</table>

SECTION D - ORGANISATION, STORAGE AND RETRIEVAL

1. Please rate your concerns about organising competitive information.

<table>
<thead>
<tr>
<th>Concern</th>
<th>Yes</th>
<th>No</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Do you organise your competitive information?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Do you have a high volume of print and electronic data to handle on a daily basis?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Do you have many types of information or formats to organise?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Have you created an index of your competitive information files?</td>
<td></td>
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<tr>
<td>e. Do you need a high storage capacity to store your information?</td>
<td></td>
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<tr>
<td>f. Are you able to link related information between various documents?</td>
<td></td>
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</tr>
<tr>
<td>g. Do you think acquiring and organising competitive information tedious?</td>
<td></td>
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<tr>
<td>h. Do you think your company would benefit from having a central storage repository for competitive information?</td>
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</tr>
<tr>
<td>i. Do you think you need training to manage competitive information?</td>
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</tr>
</tbody>
</table>

2. Would software to organise, store and retrieve the information/intelligence be useful?

<table>
<thead>
<tr>
<th>Usefulness</th>
<th>Very useful</th>
<th>Somewhat useful</th>
<th>Slightly useful</th>
<th>Not useful at all</th>
<th>Not able to say</th>
</tr>
</thead>
</table>

SECTION E - ANALYSIS OF INFORMATION

1. Which of the following are tools, which you have used to analyse market and competitive information? Please choose all that apply.

- Competitor profiles
- Financial analysis
- SWOT analysis
- Scenario development
- Winloss analysis
- War gaming
- Conjoint analysis
- Simulation/modelling
- Benchmarking and gap analysis
- Core competencies
- Patent citation analysis
- Value chain analysis
- Porter’s Five Forces
- Other (please specify):

2. Please rate your concerns about analysing competitive information.

<table>
<thead>
<tr>
<th>Concern</th>
<th>Yes</th>
<th>No</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Do you think competitive information analysis should be extensive?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Do you think there should be a variety of analytical techniques to fulfil different requirements?</td>
<td></td>
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</tr>
<tr>
<td>c. Would summaries of documents help in analysing competitive information?</td>
<td></td>
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</tr>
<tr>
<td>d. Do you think software can help in analysing competitive information?</td>
<td></td>
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<tr>
<td>e. Do you think software would be able to decide the extent to which the analysed information can be considered sufficient for appropriate decision making?</td>
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</tbody>
</table>
SECTION F – DEVELOPMENT AND DISSEMINATION OF CI REPORTS

1. Please rate your concerns about developing CI reports.

<table>
<thead>
<tr>
<th>Concern</th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Do you think the design of the report is important?</td>
<td></td>
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<tr>
<td>b. Do you think it is important for internal clients to be able to view the report in a number of formats?</td>
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<tr>
<td>c. Do you think the design of the report would have any impact on the interpretation of its contents?</td>
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<tr>
<td>d. Do you think customisability of the report is important?</td>
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<tr>
<td>e. Should the report be sophisticated and detailed?</td>
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<tr>
<td>f. Would a software to help create the report be useful?</td>
<td></td>
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</tr>
</tbody>
</table>

2. Please rate your concerns about disseminating CI reports.

<table>
<thead>
<tr>
<th>Concern</th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Are you concerned about who receives CI reports?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>b. Should there be limitations to accessing final CI reports?</td>
<td></td>
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<tr>
<td>c. Do you think there should be a balance between written, oral, and electronic modes of delivering a CI report?</td>
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<tr>
<td>d. Are you concerned about security measures to limit access by outside individuals/companies?</td>
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<tr>
<td>e. Do you think the reports should be disseminated on a scheduled basis?</td>
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<tr>
<td>f. Do you think the reports should be archived after they have been presented?</td>
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<tr>
<td>g. Would software to help disseminate the report be useful?</td>
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</tbody>
</table>

SECTION H – CI SOFTWARE

1. Please rate your concerns about systems requirements.

<table>
<thead>
<tr>
<th>Concern</th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Is/Are the computer(s) in your company connected to an in-house or online server?</td>
<td></td>
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<tr>
<td>b. Does the computer(s) in your company run on Microsoft Windows 95 or later?</td>
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<tr>
<td>c. Does the computer(s) in your company run on Intel Pentium II processor(s) or later?</td>
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<tr>
<td>d. Does the computer(s) in your company have 64MB RAM or more?</td>
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</tr>
</tbody>
</table>

2. Please choose the factors that you think may be important in choosing and implementing a CI software tool. Choose all that apply:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Training</th>
<th>Level/significance of usage</th>
<th>Required technology platforms</th>
<th>Literacy</th>
<th>Other (please specify):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price/cost of implementation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Time</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>IT support</td>
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<tr>
<td>Credibility of the software</td>
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<tr>
<td>Applicability to company structure and context</td>
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<tr>
<td>Expertise</td>
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<tr>
<td>Depreciation</td>
<td></td>
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<tr>
<td>Other (please specify)</td>
<td></td>
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</tbody>
</table>

3. How much would your company be willing to spend yearly on a software tool that supports the CI function?

<table>
<thead>
<tr>
<th>Range</th>
<th>Between RM100 and RM1,000</th>
<th>Between RM1,001 and RM5,000</th>
<th>Between RM5,001 and RM10,000</th>
<th>Between RM10,001 and RM20,000</th>
<th>Between RM20,001 and RM30,000</th>
<th>More than RM50,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not spend at all</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Between RM50,001 and RM100,000</td>
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<td></td>
</tr>
<tr>
<td>Between RM30,001 and RM50,000</td>
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</tbody>
</table>

4. How would you like CI software to benefit your company? Please choose all that apply.

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Other (please specify):</th>
</tr>
</thead>
<tbody>
<tr>
<td>To help save time</td>
<td></td>
</tr>
<tr>
<td>Increase productivity and efficiency</td>
<td></td>
</tr>
<tr>
<td>To help be more informed about business and industry</td>
<td></td>
</tr>
<tr>
<td>To help alert to changes in the competitive environment</td>
<td></td>
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<tr>
<td>To help make better preparations in facing competition</td>
<td></td>
</tr>
<tr>
<td>To help analyse competitive information</td>
<td></td>
</tr>
<tr>
<td>To better organise related information</td>
<td></td>
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<tr>
<td>To better support marketing efforts</td>
<td></td>
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<tr>
<td>To help make better and more informed decisions</td>
<td></td>
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<tr>
<td>To better retrieve information that are relevant and timely</td>
<td></td>
</tr>
<tr>
<td>To better disseminate competitive information among employees</td>
<td></td>
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<tr>
<td>Other (please specify):</td>
<td></td>
</tr>
</tbody>
</table>

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5. What CI software application(s) do you use currently, if any? (Select all that apply.)
   - We do not use any CI software applications
   - Customised application(s), intranet or portal
   - Strategy!
   - Copernic
   - Cipher
   - Brimstone
   - Wincite
   - Botbox
   - Promere
   - Docere
   - C4U
   - Other (please specify): __________

6. Is there any other comment, concern or suggestion that you would like to make concerning the CI process or CI software tool? Please state below.

   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________

THANK YOU FOR YOUR PARTICIPATION
### A1.2 Codes and Labels Used for Statistical Analysis Using SPSS 11 in Stage 1

<table>
<thead>
<tr>
<th>Coding Scheme</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q CODE LABEL</td>
<td>None</td>
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<td>1=all levels, 2=upper management, 3=most employees, 4=no technology platform, 5=only relevant employees</td>
</tr>
<tr>
<td>6 finance</td>
<td>1=less 1m, 2=1m-5m, 3=5m-10m, 4=11m-15m, 5=16m-20m, 6=21m-25m, 7=more 25m</td>
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Identification of information source
Monitoring content
Filtering content
Alerting of information
Importation of information
Screening of information
Rating of information
Ethical acquisition
Software/technology useful
Competitor profiles
Financial analysis
SWOT analysis
Scenario development
Win/loss analysis
War game
Conjoint analysis
Simulation/modeling
Benchmarking and gap analysis
Core competencies
Patent citation
Value chain analysis
Porter's Five Forces
Don't know
Other
Competitive information analysis should be extensive
variety of techniques to fulfill different requirements
Summaries of documents
depend on software
Software can offer limited help
design important
view the report in a number of different formats
design of the report should influence the interpretation of its contents
should be flexible and customisable
reports should be detailed and sophisticated
Software to help create CI reports
limits as to whom are given access
balance between written, oral, and electronic modes
Security measures should be taken
should be disseminated on a scheduled basis
should be kept and archived after it has been presented
Software to help disseminate CI reports
connected to an in-house or online server
run on Microsoft Windows 98 or later
run on Intel Pentium II processor(s) or later
have 64MB RAM or more
Price/cost of implementation
Security
Training
Time
Maintenance
Level/significance of usage
IT support
Expertise
Required technology platforms
Credibility of the software
Depreciation
Literacy
Applicability to company structure and context
Other
We do not use any CI software applications
Customised application(s), intranet or portal
Strategy
Copernic
Cipher
Brimstone
Wincite
Botbox
Promere
Docere
C4U
Other
Spending

1 = strongly disagree, 2 = somewhat disagree, 3 = neutral, 4 = somewhat agree, 5 = strongly agree
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sys3_1   SMEAN(sys3)
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A1.3 The Dendrogram (by Case) Produced by SPSS 11 in Stage One

* * * * * HIERARCHICAL CLUSTER ANALYSIS * * * * *

Dendrogram using Average Linkage (Between Groups)

Rescaled Distance Cluster Combine

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* * * * * HIERARCHICAL CLUSTER ANALYSIS * * * * *

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### A1.4 The Dendrogram (by Question) Produced by SPSS 11 in Stage One

#### Hierarchical Cluster Analysis

Dendrogram using Average Linkage (Between Groups)

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**Hierarchical Cluster Analysis**

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A1.5 Key Intelligence Topics (KIT) Interview Used in Stage 1 to Investigate the SMEs’ Key Intelligence Needs

Interview
RESEARCH SURVEY TITLE (Code: KitQ)
Evaluation of Competitive Intelligence (CI) Software for Small and Medium-size Enterprises (SMEs) in Malaysia (Part 1)

RESEARCHER
Mr. A.S. Juhari
Department of Information Science, Loughborough University

Background
Key Intelligence Topics (KITs) is a process for identifying and prioritising both management’s and the organisation’s key intelligent needs. Key intelligence needs play an important role in identifying the variations and similarities in terms of strategic targets, areas of development, and key competitors. At the onset of a Competitive Intelligence (CI) program, such a KIT interview provides the focus needed to conduct effective CI operations and produce appropriate intelligence.

Introduction
This interview aims to investigate small and medium-size enterprises (SMEs) in Malaysia in the context of competitive intelligence needs and requirements. The information gathered from this survey will be used to help create proper simulations in an extensive evaluation study of CI software aimed for usage in SMEs. Therefore, I am very grateful for your participation, and hope that the results would enhance the capabilities of small and medium-size enterprises in monitoring competition. The results of this research will be in the form of a PhD dissertation for the Department of Information Science, Loughborough University, UK. Do you have any questions that you need clarified? [If 'yes', explain further; if 'no' proceed to next paragraph]

In order to obtain thematic data, this interview will be recorded. [Forward participant consent to be signed]. Is this acceptable to you? [If 'yes', both parties sign the Consent Form; if 'no', say: It will be more time consuming and the words may not be as accurate as you verbalised answers. I assure you that all answers are completely confidential. I cannot provide any information in this interview to anyone without your expressed permission. If still 'no', then say: May I jot down your answers instead?]

Instruction
Please answer as honestly as you may. If you feel any question is uncomfortable to you, please inform me and we will proceed to the next question. You may terminate this interview at any time.
SECTION A – BUSINESS DECISIONS AND STRATEGIC/TACTICAL TOPICS

1. What decisions and/or actions will you/your team be facing in the next 6-12 months, where competitive information could make a significant difference?

____________________________________________________________________

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2. What kind of competitive information do you think you need?

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3. How will you use that competitive information?

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4. When will it be needed? Why (in that time frame)?

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SECTION B – EARLY-WARNING TOPICS

1. What was the most recent unexpected event that happened within your industry, business, or company that you did not anticipate?

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2. If you had prior intelligence and was able to anticipate it, what would you have done differently?

____________________________________________________________________

____________________________________________________________________

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____________________________________________________________________

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3. What are potential surprise topics you do not want to be surprised by? (For example, new competitors, technology introductions, alliances & acquisitions, regulatory changes, etc.)

4. How do you think competitive information can help you to anticipate those 'surprises'?

SECTION C – KEY PLAYERS (competitors, customers, suppliers, regulators, etc.)

1. Who are the key players within your marketplace that you think the company needs to better understand?

2. What specifically does your company need to know?

3. What would you do with the information about the key players?

This is the end of the interview. Are there any questions that you would like to ask? If not, thank you for your participation.
Interview with a Manager from a Software Development Company

Question
What decisions and/or actions will you/your team be facing in the next 6-12 months, where competitive information could make a significant difference?

Answer
Within the next year, there’s a lot of things we plan to do and all decisions made around them will involve the use of competitive information. We will be working on expanding our products and services into different areas in software design and development. This in itself is competitive strategy to prepare for changes in trends and consumer preferences, where the variation in products will allow our company to be flexible to different markets and then we can specialise according to demand. This will go on as our short to medium-term strategic plan, which is mainly to be able to find out what our company should specialise in from gained experiences and working with prospective clients within the next one to three years. In other words, market experience and the nature and needs of our future clients for the next few years should determine our niche. Another focus is the cash flow to make sure the expansion pulls through, which most likely will involve financial institutes, like venture capitalists, and perhaps try not to lose too much control over the company, as many financial institutes have their own agendas when funding projects.

Question
What kind of competitive information do you think you need?

Answer
Speaking of investments, a major aspect of the competitive environment we would be interested in being in the know would be investments made by other companies in our industry and obviously, who are they investing with and the reasons why they are investing with them and not with the other investors. Perhaps, maybe another good thing to know is how much are spent for such investments to take place. Maybe you can guide me on how I can get my hands on those kinds of information.
Question
That's actually one of my questions for you. In your opinion, where will you be looking for those types of information that you've mentioned?

Good one. It's hard to say but perhaps our employees could be a good source of information, like those who often liaise with other companies in the industry and financial institutions, but I can't be sure of how much I could get out of them. Maybe some information can be obtained from the Internet and magazines, although current news and investment information on Malaysian SMEs from published sources aren't much and not very dependable. News databases from Bernama online provide up-to-date information on the latest trends and current product releases in the local and global markets. And of course, the Internet is also a main source for this information.

Question
How will you use that competitive information?

Answer
The information on competitors' involvements in the investment community and other types of investment is used to develop future investment strategy towards expanding the company's products. Information on successful investment decisions as well as any investment mistakes is analysed for what is to be gained and avoided. Particularly, this information is used to chart directions to the right types of investors who are already interested and experienced in the specific areas of expansion and are willing to take the appropriate actions and risks. On the other end, however, foul play in the investment community is very common; hence, there is a need for a mature view on the prospective investors. Therefore, decisions about what to do with investors can be supported by accurate information to help, among other things, steer clear of being on the losing end of contracts and deals being made because many investors are often larger firms that are experienced in taking advantage of smaller, often desperate smaller firms.

Question
When will this type of information is needed?

Answer
Information on competitors' investment decisions and the investment community should be updated as soon as there are any changes. Just-in-time information is crucial any company
because preparations and changes in our decisions depend heavily on these changes in the environment.

Question
What was the most recent unexpected event that happened within your industry, business, or company that you did not anticipate?

Answer
Companies in the software business are at the mercy of technological shifts and constant changes in customer perceptions on ‘our’ products and services. Although technological breakthroughs are considered important for industry development, these events have caused drastic changes and shifts in the marketplace. Only in a few companies in the software industry have been able to sustain their place in the market while most companies struggle to break into the market only to find another breakthrough product launched, causing their own line of products and services to be obsolete. A company could do exactly what we are planning right now, which is to create an entire line of new software products along with marketing efforts to secure product positioning in the market, however, we have to realise the possibility of being overturned by another product line from another company that was heavily invested but again, even for them, may be just as quick and just as temporary. It’s almost a game we must play, when we create a new line of product, it is almost immediately that we must think of our next new line of products and services.

Question
If you had prior intelligence and was able to anticipate it, what would you have done differently?

Answer
Easier said that done, but the answer to that question is or I think an appropriate move would be to launch a product or a product line that would be flexible to changes in both customer needs and future developments. But again, it is easier said than done and it’s just easy to answer questions like these but how much of it can be expect to actually happen. I’d like to say it is an impossibility because of the constant changes that occur in the industry. Nevertheless, it is possible to predict certain aspects of movements in the market. A recent example was the new developments in computer hardware, like the PDA and other mobile/portable alternatives to the
computer, which allowed smaller companies to start afresh in developing scaled down versions of larger applications.

Question
What are potential surprise topics you do not want to be surprised by?

Answer
Any of them.

Question
How do you think competitive information can help you to anticipate those 'surprises'?

Answer
Competitive information comes in forms of clues and from trends from, perhaps, supporting products, which makes it possible to predict certain aspects of movements in the market. The example about the PDA applies here.

Question
Who are the key players within your marketplace that you think the company needs to better understand?

Answer
Key players in the software industry are dominated by large multinational companies. But although these companies are naturally considered threats to smaller companies like ours on many levels, they are often also considered prospective clients in need of outsourcing support and as acting middlepersons for a larger market reach. So it can get complicated.

Question
What specifically does your company need to know about these larger companies?

Answer
Information about their capabilities and whether any of the applications and services can be further augmented by the skills and ideas of smaller companies such as ours would be good to...
know. In this regard, competitive information which include other companies competing for the same contracts would also be useful.

Question
What would you do with this information?

Answer
The information would be used to gain a better perspective on competitors and clients, therefore providing a more prepared approach to succeed in a contract tender.


**APPENDIX 2**

**CI SOFTWARE EVALUATION STRUCTURES AND QUESTIONNAIRE FOR PERCEIVED EFFECTIVENESS OF STAGE TWO**

A2.1 CI Software Evaluation Criteria for Software Developers

**Intelligence Cycle Functions Criteria**

<table>
<thead>
<tr>
<th>I. Identification of CI needs</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation Questions</td>
<td></td>
</tr>
<tr>
<td>• Does the application help to identify the main CI client communities?</td>
<td>• text summarising</td>
</tr>
<tr>
<td>• Does the application help to identify CI topics?</td>
<td>• text analysing and structuring</td>
</tr>
<tr>
<td>• Does the application help to identify the pieces of information required to address the CI topics?</td>
<td></td>
</tr>
<tr>
<td>• Does the application help to identify CI analytical techniques to address the needs of the CI clients?</td>
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<tr>
<td>• Can the topics and analytical techniques be changed?</td>
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</table>

<table>
<thead>
<tr>
<th>II. Acquisition of competitive information</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation Questions</td>
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<tr>
<td>• Does the application help to identify external information sources?</td>
<td>• profiling/push technology</td>
</tr>
<tr>
<td>• Does the application help to identify internal information sources?</td>
<td>• filtering/intelligent agents</td>
</tr>
<tr>
<td>• Does the application relate information with specific topics?</td>
<td>• web searching</td>
</tr>
<tr>
<td>• Does the application have the capability to monitor content changes within information sources? (e.g., message pop ups to inform about changes)</td>
<td>• information services</td>
</tr>
<tr>
<td>• Does the application have the capability to monitor changes regarding information sources? (e.g., message pop ups to inform about new addresses, address changes, addresses deleted)</td>
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<tr>
<td>• Does the application have the capability to find specific pieces of information in particular sources? (e.g., running specific queries in preselected courses)</td>
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<tr>
<td>• Does the application have the capability to filter information to meet minimal CI needs? (e.g., highlighting search terms, summarising articles)</td>
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</tr>
</tbody>
</table>
- Does the application have the capability to notify users about new information? (e.g., push technology)
- Does the application have the capability to import information in different formats? (e.g., HTML, PDF, Excel, Word, PowerPoint files)
- Does the application have the capability to screen out redundant or repetitive information?
- Does the application have a function for rating the qualitative value of information?

### III. Organisation, storage, and retrieval

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Related technologies and software functions</th>
</tr>
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<tbody>
<tr>
<td>Does the application offer an indexing function?</td>
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<tr>
<td>Does the application allow for hierarchical links?</td>
<td>text discovering</td>
</tr>
<tr>
<td>Does the application allow for Cross-topic linking?</td>
<td>groupware</td>
</tr>
<tr>
<td>Does the application store a variety of formats?</td>
<td>multipurpose portals</td>
</tr>
<tr>
<td>Does the application offer an internal search facility?</td>
<td>text analysing and structuring</td>
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<tr>
<td>Does the application allow for browsing?</td>
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### IV. Analysis of information

<table>
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<th>Related technologies and software functions</th>
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<td>Does the application offer a variety of CI analytical techniques? (e.g., three or more types of techniques, basic company profiles not considered here)</td>
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<tr>
<td>Does the application allow for varying levels of analysis?</td>
<td>Text analysing and structuring</td>
</tr>
<tr>
<td>Does the application synthesise (summarise) information in any way?</td>
<td>Analysing and reporting data</td>
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<tr>
<td>Does the application result in recommendations for action?</td>
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</table>

### V. Development of CI products

<table>
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<tr>
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<td>Does the application offer a variety of formats for viewing the final product?</td>
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**VI. Distribution of CI products**

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<td>• multipurpose portals</td>
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<td></td>
<td>• information services</td>
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</table>

**Systems Criteria**

- Majority were server enabled (63%)
- 96% use Windows-based operating system
- have sufficient processing speed and RAM

**Simulation Criteria**

- Subject concerns include areas of expansion, industry investments.
- Monitors changes in customer perceptions, and activities of larger firms and competitors

**Financial Criteria**

- Majority have high concerns on price (71%) and are not ready to pay anything for CI software (66%).
A2.2 CI Software Evaluation Criteria for Production and Design

Intelligence Cycle Functions Criteria

I. Acquisition of competitive information

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Does the application help to identify external information sources?</td>
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<td>- Does the application have a function for rating the qualitative value of information?</td>
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</table>

II. Organisation, storage, and retrieval

<table>
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<td>- groupware</td>
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<td>Requirements</td>
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<td>Cross-topic linking?</td>
<td>multipurpose portals</td>
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</tbody>
</table>

**Systems Criteria**
- 55% server enabled
- Majority use Windows-based operating system
- Have sufficient processing speed, and RAM

**Simulation Criteria**
- Monitors environment to make sure product is unique in approach and design by monitoring competitors
- Anticipate changing preferences of clients and factors that influence the changes

**Other Criteria**
- 36% - no allocation for CI software
- 30% - would pay between RM100 to RM1000
- 30% - would pay no more than RM5000
- High concerns on price (58%) and the prospective level of usage (61%)
**A2.3 CI Software Evaluation Criteria for Content Developers**

### Intelligence Cycle Functions Criteria

#### I. Analysis of information

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Related technologies and software functions</th>
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</thead>
</table>
| - Does the application offer a variety of CI analytical techniques? (e.g., three or more types of techniques, basic company profiles not considered here) | - Text summarising  
- Text analysing and structuring  
- Analysing and reporting data |
| - Does the application allow for varying levels of analysis? |  |
| - Does the application synthesise (summarise) information in any way? |  |
| - Does the application result in recommendations for action? |  |

### Systems Criteria

- 58% server enabled
- Majority use Windows-based operating system
- Have sufficient processing speed, and RAM

### Simulation Criteria

- Monitor advancements in online editing, animation apps for web page building, publishing apps.
- Subjects include direct competitors, large content firms, and freelancers.

### Financial and Other Criteria

- High concerns on price (72%), the prospective level of usage (50%) and training (41%).
- Moderate concerns for security (33%) and maintenance (29%).
- 26% would below RM1000 for CI software and 21% would only spend between RM10000 and RM20000.
## A2.4 CI Software Evaluation Criteria for Telecommunications

### Intelligence Cycle Functions Criteria

#### I. Organisation, storage, and retrieval

<table>
<thead>
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<tr>
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</tbody>
</table>

### Systems Criteria

- 50% server enabled
- 94% use Windows-based operating system
- have sufficient processing speed, and RAM

### Simulation Criteria

- Monitors pricing and new Internet-based telecommunications technology
- Subjects included Telekom Malaysia, mobile and wireless service providers, and ISPs

### Other Criteria

- High concerns on price (72%), the prospective level of usage (50%) and applicability to structure (33%)
- 44% would not spend anything for CI software
- 27% would only spend below RM1000.
A2.5 CI Software Evaluation Criteria for Education and Training

### Intelligence Cycle Functions Criteria

#### I. Analysis of information

<table>
<thead>
<tr>
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<tr>
<td>• Does the application allow for varying levels of analysis?</td>
<td>• Text analysing and structuring</td>
</tr>
<tr>
<td>• Does the application synthesise (summarise) information in any way?</td>
<td>• Analysing and reporting data</td>
</tr>
<tr>
<td>• Does the application result in recommendations for action?</td>
<td></td>
</tr>
</tbody>
</table>

#### II. Development of CI products

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does the application offer a variety of formats for viewing the final product?</td>
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</tr>
<tr>
<td>• Are the formats effective in conveying CI?</td>
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</tr>
<tr>
<td>• Can one format be easily adapted to another format?</td>
<td>• information services and vendors</td>
</tr>
</tbody>
</table>

#### III. Distribution of CI products

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
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</thead>
<tbody>
<tr>
<td>• Does the application offer a function for distributing intelligence?</td>
<td>• groupware</td>
</tr>
<tr>
<td>• Does the application help to identify potential CI consumers in the light of particular CI products?</td>
<td>• multipurpose portals</td>
</tr>
<tr>
<td></td>
<td>• information services</td>
</tr>
</tbody>
</table>

#### Systems Criteria

- 60% not connected to any server
- 40% server enabled
- 100% use Windows-based operating system
- have sufficient processing speed, and RAM

#### Simulation Criteria

- Concerns marketing training and academic programs
- Develop reputation and standards
- Monitors changes in accreditation standards, the Ministry of Higher Education and colleges.

#### Financial and Other Criteria

- 25% would not pay for CI software
- 35% would pay RM1000 to RM5000.
- 15% would pay more than RM50000
- High concerns on price (45%) and level of usage (50%).
- Moderate concerns for software’s credibility (25%) and applicability to company structure and context (25%).
## A2.6 CI Software Evaluation Criteria for Hardware and Electronics Design

### Intelligence Cycle Functions Criteria

#### I. Acquisition of competitive information

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does the application help to identify external information sources?</td>
<td>• profiling/push technology</td>
</tr>
<tr>
<td>• Does the application help to identify internal information sources?</td>
<td>• filtering/intelligent agents</td>
</tr>
<tr>
<td>• Does the application relate information with specific topics?</td>
<td>• web searching</td>
</tr>
<tr>
<td>• Does the application have the capability to monitor content changes within information sources? (e.g., message pop ups to inform about changes)</td>
<td>• information services</td>
</tr>
<tr>
<td>• Does the application have the capability to monitor changes regarding information sources? (e.g., message pop ups to inform about new addresses, address changes, addresses deleted)</td>
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</tr>
<tr>
<td>• Does the application have the capability to find specific pieces of information in particular sources? (e.g., running specific queries in preselected courses)</td>
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</tr>
<tr>
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</tr>
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</tr>
<tr>
<td>• Does the application have the capability to import information in different formats? (e.g., HTML, PDF, Excel, Word, PowerPoint files)</td>
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<td>• Does the application have the capability to screen out redundant or repetitive information?</td>
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</tr>
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<td>• Does the application have a function for rating the qualitative value of information?</td>
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</tbody>
</table>

### II. Organisation, storage, and retrieval

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<thead>
<tr>
<th>Evaluation Questions</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does the application offer an indexing function?</td>
<td>• content management</td>
</tr>
<tr>
<td>• Does the application allow for hierarchical links?</td>
<td>• text discovering</td>
</tr>
<tr>
<td></td>
<td>• groupware</td>
</tr>
<tr>
<td>Evaluation Questions</td>
<td>Related technologies and software functions</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Does the application allow for Cross-topic linking?</td>
<td>multipurpose portals</td>
</tr>
<tr>
<td>Does the application store a variety of formats?</td>
<td>text analysing and structuring</td>
</tr>
<tr>
<td>Does the application offer an internal search facility?</td>
<td></td>
</tr>
<tr>
<td>Does the application allow for browsing?</td>
<td></td>
</tr>
</tbody>
</table>

**III. Analysis of information**

<table>
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<tr>
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</thead>
<tbody>
<tr>
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**IV. Development of CI products**

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</table>

**V. Distribution of CI products**

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<td>multipurpose portals</td>
</tr>
<tr>
<td></td>
<td>information services</td>
</tr>
</tbody>
</table>

**Systems Criteria**

- Majority were server enabled (58%)
- 100% use Windows-based operating system
- have sufficient processing speed and RAM

**Simulation Criteria**

- Concerns brand building, advances in design and manufacturing, suppliers and transportation
- Improved liaises with stakeholders.
- Interest in possible alliances with multinationals.
Financial and Other Criteria

- 36% were not ready to allocate funds for CI software.
- 26% would pay RM1000 to RM5000.
- 10% would pay RM5000 to RM10000.
- 10% would pay more than RM50000.
- Majority have high concerns on price (57%) and level of usage (52%).
### A2.7 CI Software Evaluation Criteria for Systems Security

#### Intelligence Cycle Functions Criteria

<table>
<thead>
<tr>
<th>I. Acquisition of competitive information</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>• Does the application help to identify</td>
<td>• profiling/push technology</td>
</tr>
<tr>
<td>external information sources?</td>
<td>• filtering/intelligent agents</td>
</tr>
<tr>
<td>• Does the application help to identify</td>
<td>• web searching</td>
</tr>
<tr>
<td>internal information sources?</td>
<td>• information services</td>
</tr>
<tr>
<td>• Does the application relate information</td>
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<tr>
<td>with specific topics?</td>
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<tr>
<td>• Does the application have the</td>
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<tr>
<td>capability to monitor content changes</td>
<td></td>
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<tr>
<td>within information sources? (e.g.,</td>
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<tr>
<td>message pop ups to inform about changes)</td>
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<tr>
<td>• Does the application have the</td>
<td></td>
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<tr>
<td>capability to monitor changes</td>
<td></td>
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<tr>
<td>regarding information sources? (e.g.,</td>
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<tr>
<td>message pop ups to inform about new</td>
<td></td>
</tr>
<tr>
<td>addresses, address changes, addresses</td>
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<tr>
<td>deleted)</td>
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<tr>
<td>• Does the application have the</td>
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<tr>
<td>capability to find specific pieces of</td>
<td></td>
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<tr>
<td>information in particular sources? (e.g.,</td>
<td></td>
</tr>
<tr>
<td>running specific queries in pre-selected</td>
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</tr>
<tr>
<td>courses)</td>
<td></td>
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<tr>
<td>• Does the application have the</td>
<td></td>
</tr>
<tr>
<td>capability to filter information to</td>
<td></td>
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<tr>
<td>meet minimal CI needs? (e.g.,</td>
<td></td>
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<tr>
<td>highlighting search terms, summarising</td>
<td></td>
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<tr>
<td>articles)</td>
<td></td>
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<tr>
<td>• Does the application have the</td>
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</tr>
<tr>
<td>capability to notify users about new</td>
<td></td>
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<tr>
<td>information? (e.g., push technology)</td>
<td></td>
</tr>
<tr>
<td>• Does the application have the</td>
<td></td>
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<tr>
<td>capability to import information in</td>
<td></td>
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<tr>
<td>different formats? (e.g., HTML, PDF,</td>
<td></td>
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<tr>
<td>Excel, Word, PowerPoint files)</td>
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<tr>
<td>• Does the application have the</td>
<td></td>
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<tr>
<td>capability to screen out redundant or</td>
<td></td>
</tr>
<tr>
<td>repetitive information?</td>
<td></td>
</tr>
<tr>
<td>• Does the application have a function</td>
<td></td>
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<tr>
<td>for rating the qualitative value of</td>
<td></td>
</tr>
<tr>
<td>information?</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Distribution of CI products</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaluation Questions</strong></td>
<td></td>
</tr>
<tr>
<td>• Does the application offer a function</td>
<td>• groupware</td>
</tr>
<tr>
<td>for distributing intelligence?</td>
<td>• multipurpose portals</td>
</tr>
<tr>
<td>• Does the application help to identify</td>
<td>• information services</td>
</tr>
<tr>
<td>potential CI consumers in the light of</td>
<td></td>
</tr>
<tr>
<td>related technologies and software</td>
<td></td>
</tr>
<tr>
<td>functions</td>
<td></td>
</tr>
</tbody>
</table>

303
<table>
<thead>
<tr>
<th>particular CI products?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems Criteria</td>
</tr>
<tr>
<td>• 71% server enabled</td>
</tr>
<tr>
<td>• 100% use Windows-based operating system</td>
</tr>
<tr>
<td>• have sufficient processing speed and RAM</td>
</tr>
<tr>
<td>Simulation Criteria</td>
</tr>
<tr>
<td>• Topics concern brand development and possible strategic alliances</td>
</tr>
<tr>
<td>• Looking for possibilities to be bought over to be part of multi service organisation</td>
</tr>
<tr>
<td>Financial and Other Criteria</td>
</tr>
<tr>
<td>• 14% - no allocation for CI software</td>
</tr>
<tr>
<td>• 28% - would pay between RM100 to RM1000</td>
</tr>
<tr>
<td>• 42% - would pay no more than RM5000</td>
</tr>
<tr>
<td>• High concerns on price (57%), and security (42%).</td>
</tr>
<tr>
<td>• Moderate concerns on maintenance, level of usage, and expertise (28% respectively)</td>
</tr>
</tbody>
</table>
## A2.8 CI Software Evaluation Criteria for Systems Integration

### Intelligence Cycle Functions Criteria

#### I. Analysis of information

**Evaluation Questions**
- Does the application offer a variety of CI analytical techniques? (e.g., three or more types of techniques, basic company profiles not considered here)
- Does the application allow for varying levels of analysis?
- Does the application synthesise (summarise) information in any way?
- Does the application result in recommendations for action?

**Related technologies and software functions**
- Text summarising
- Text analysing and structuring
- Analysing and reporting data

#### II. Development of CI products

**Evaluation Questions**
- Does the application offer a variety of formats for viewing the final product?
- Are the formats effective in conveying CI?
- Can one format be easily adapted to another format?

**Related technologies and software functions**
- Test summarising
- Text analysing and structuring
- Information services and vendors

#### III. Distribution of CI products

**Evaluation Questions**
- Does the application offer a function for distributing intelligence?
- Does the application help to identify potential CI consumers in the light of particular CI products?

**Related technologies and software functions**
- Groupware
- Multipurpose portals
- Information services

### Systems Criteria

- Majority were server enabled (94%)
- 100% use Windows-based operating system
- Have sufficient processing speed and RAM

### Simulation Criteria

- Aims to establish brand and reputation.
- Monitors changes in related technologies, and competitors

### Financial and Other Criteria

- 33% would pay above RM50000 for CI software.
- 16% would pay RM30000 to RM50000.
- 22% would pay RM5000 to RM10000.
- High concerns on price (55%) and level of usage (55%).
- Moderate concerns for training (33%), maintenance (27%), and applicability to company structure and text (38%).
A2.9 CI Software Evaluation Criteria for Mobile and Wireless Technologies

Intelligence Cycle Functions Criteria

I. Identification of CI needs

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does the application help to identify the main CI client communities?</td>
<td>• text summarising</td>
</tr>
<tr>
<td>• Does the application help to identify CI topics?</td>
<td>• text analysing and structuring</td>
</tr>
<tr>
<td>• Does the application help to identify the pieces of information required to address the CI topics?</td>
<td></td>
</tr>
<tr>
<td>• Does the application help to identify CI analytical techniques to address the needs of the CI clients?</td>
<td></td>
</tr>
<tr>
<td>• Can the topics and analytical techniques be changed?</td>
<td></td>
</tr>
</tbody>
</table>

II. Acquisition of competitive information

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Related technologies and software functions</th>
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<tbody>
<tr>
<td>• Does the application help to identify external information sources?</td>
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different formats? (e.g., HTML, PDF, Excel, Word, PowerPoint files)
- Does the application have the capability to screen out redundant or repetitive information?
- Does the application have a function for rating the qualitative value of information?

<table>
<thead>
<tr>
<th>III. Organisation, storage, and retrieval</th>
<th>Related technologies and software functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation Questions</td>
<td>Does the application offer an indexing function?</td>
</tr>
<tr>
<td>Evaluation Questions</td>
<td>Does the application allow for hierarchical links?</td>
</tr>
<tr>
<td>Evaluation Questions</td>
<td>Does the application allow for Cross-topic linking?</td>
</tr>
<tr>
<td>Evaluation Questions</td>
<td>Does the application store a variety of formats?</td>
</tr>
<tr>
<td>Evaluation Questions</td>
<td>Does the application offer an internal search facility?</td>
</tr>
<tr>
<td>Evaluation Questions</td>
<td>Does the application allow for browsing?</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>IV. Analysis of information</th>
<th>Related technologies and software functions</th>
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</thead>
<tbody>
<tr>
<td>Evaluation Questions</td>
<td>Does the application offer a variety of CI analytical techniques? (e.g., three or more types of techniques, basic company profiles not considered here)</td>
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<tr>
<th>V. Development of CI products</th>
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<td>Evaluation Questions</td>
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</tr>
<tr>
<td>Evaluation Questions</td>
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<table>
<thead>
<tr>
<th>• Does the application help to identify potential CI consumers in the light of particular CI products?</th>
<th>• information services</th>
</tr>
</thead>
</table>

**Systems Criteria**
- 57% not connected to any server
- 39% server enabled
- Majority use Windows-based operating system
- have sufficient processing speed, and RAM

**Simulation Criteria**
- Monitor rapid movement in technology product releases
- Monitor changes in services in the competitive environment
- Focus on topics related to competitors, manufacturers of mobile hardware and related electronics products.

**Financial and Other Criteria**
- 45% were not ready to allocate funds for CI software and 36% would pay no more than RM1000.
- Majority have high concerns on price (82%), maintenance (30%) and level of usage (34%).
### A2.10 CI Software Evaluation Criteria for Shared Services

#### Intelligence Cycle Functions Criteria

#### I. Analysis of Information

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<thead>
<tr>
<th>Evaluation Questions</th>
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#### II. Development of CI Products

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#### III. Distribution of CI Products

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<td>groupware</td>
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<tr>
<td>Does the application help to identify potential CI consumers in the light of particular CI products?</td>
<td>multipurpose portals</td>
</tr>
<tr>
<td></td>
<td>information services</td>
</tr>
</tbody>
</table>

#### Systems Criteria

- 54% not connected to any server
- 46% server enabled
- Majority use Windows-based operating system
- Have sufficient processing speed, and RAM

#### Simulation Criteria

- To be aware of other firms that offer similar services
- Monitors changes in structure and context of parent company to anticipate changes in needs

#### Financial and Other Criteria

- 39% would pay between RM1000 and RM5000 for CI software.
- 17% were not ready to pay anything and 14% would pay below RM1000.
- High concerns on price (64%) and level of usage (53%).
- Moderate concerns for technology requirements (35%) and applicability to company structure and text (25%).

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A2.11 Questionnaire Used to Investigate the Perceived Effectiveness of CI Software Recommended by the Research to Prospective Users in SMEs

Questionnaire

RESEARCH SURVEY TITLE (Code: CIQ3)
Competitive Intelligence (CI) for Small and Medium-Size Enterprises (SMEs) in Malaysia (Part 3)

RESEARCHER
Mr. A.S. Juhari
Department of Information Science, Loughborough University

Competitive intelligence (CI) is a systematic and ethical process for gathering, analysing, and applying information about the capabilities, vulnerabilities, and the intentions of competitors, and monitoring developments within the overall competitive environment. In augmenting the CI process within companies, software companies have emerged to especially develop software tools that would enhance the CI process and the value competitive intelligence brings to companies. However, there are many uncertainties in the usability of CI software, especially for small and medium-size enterprises (SMEs).

This series of questionnaires aims to investigate small and medium-size enterprises in Malaysia in the context of managing competitive intelligence. The information gathered from this survey will be used for an extensive evaluation study of CI software aimed for usage in SMEs. Therefore, I am very grateful for your participation, and hope that the results would enhance the capabilities of small and medium-size enterprises in monitoring competition. The results of this research will be in the form of a PhD dissertation for the Department of Information Science, Loughborough University, UK.

The information that you provide will be treated with the greatest care, in order to protect you and the company. No names of individuals, companies or products will be published. However, I may need to contact you again for further clarification of your answers and/or for demonstrations of CI software products to gain feedback, which may be necessary. Also, participants will be able to obtain the results of the research, if these would be of interest.

Should you wish to contact me, please use the following address and/or e-mail.

Address,
Ariff Syah Juhari, Ph.D. Candidate
Department of Information Science,
Loughborough University,
Leicestershire LE11 3TU,
United Kingdom

E-mail: a.s.juhari@lboro.ac.uk
INSTRUCTION: Please tick (✓) in the relevant box and state answer where needed.

SECTION A – PERCEIVED USEFULNESS

<table>
<thead>
<tr>
<th>Please rate the level of USEFULNESS of the CI software recommended</th>
<th>Not Useful</th>
<th>Not Very Useful</th>
<th>Neutral</th>
<th>Fairly Useful</th>
<th>Very useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Using the system in my job would enable me to accomplish tasks more quickly</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>b. Using the system would improve my job performance</td>
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<td></td>
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<tr>
<td>c. Using the system in my job would increase my productivity</td>
<td></td>
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<tr>
<td>d. Using the system would enhance my effectiveness on the job</td>
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<tr>
<td>e. Using the system would make it easier to do my job</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>f. I would find the system useful in my job</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

SECTION B – PERCEIVED EASE-OF-USE

<table>
<thead>
<tr>
<th>Please rate the level in terms of EASE-OF-USE of the CI software recommended</th>
<th>Difficult</th>
<th>Fairly Difficult</th>
<th>Neutral</th>
<th>Fairly Easy</th>
<th>Very Easy</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Learning to operate the system would be easy for me</td>
<td></td>
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<tr>
<td>b. I would find it easy to get the system to do what I want it to do</td>
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<tr>
<td>c. My interaction with the system would be clear and understandable</td>
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<tr>
<td>d. I would find the system to be flexible to interact with</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>e. It would be easy for me to become skillful at using the system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. I would find the system easy to use</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

SECTION C – NEGATIVE AND POSITIVE ASPECTS OF THE CI SOFTWARE

1. List three most negative aspects of the CI software

1)  
2)  
3)  

2. List three most positive aspects of the CI software

1)  
2)  
3)  

THANK YOU FOR YOUR PARTICIPATION