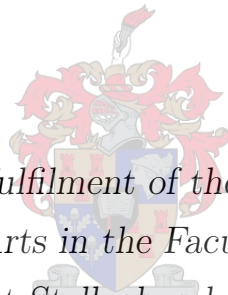


Enterprise Resource Planning Systems Selection in
the Wine Industry of the Western Cape: A
Qualitative Case Study

by

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*Thesis presented in fulfilment of the requirements for the
degree of Master of Arts in the Faculty of Arts and Social
Sciences at Stellenbosch University*

Supervisor: Daniel le Roux

December 2011

Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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Abstract

Enterprise Resource Planning Systems Selection in the Wine Industry of the Western Cape: A Qualitative Case Study

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Thesis: Master of Arts (Socio-Informatics)

December 2011

The globalised business environment of the 21st century is a complex space for organisations to navigate. As a means of dealing with the challenges and demands brought about by increased interconnectedness and interdependence, organisations are increasingly turning to information and communication technology (ICT), and especially advanced forms of ICT such as enterprise resource planning (ERP) systems. An ERP system encompasses the promise of a seamless integration of business processes to be managed by a single business software application, which can be used to increase competitiveness and assist managers in strategically positioning their organisations for the future.

This is especially true in the case of small to medium-sized enterprises (SMEs) which constitute a large and important part of the economies of numerous countries. As the ERP systems market for larger organisations became saturated at the beginning of the previous decade, ERP system vendors started to target SMEs by developing smaller and less expensive software solutions specifically aimed at this market segment. However, research has shown that these enterprises differ from their larger counterparts in size-specific and industry-specific ways which can greatly affect their acquisition of ERP systems: SMEs often face severe resource constraints and cannot afford the costs associated with failed ERP system implementation efforts. As a result, it becomes all the more important to follow a proper ERP system selection procedure before committing scarce and irrevocable resources to implementation.

The purpose of this thesis is to define and describe the size-specific and industry-specific factors that play an important role during ERP system selection (Chapter 1). ERP system selection factors in the literature are summarised and synthesised into a comprehensive framework used to guide the execution of the study (Chapter 2). To this

end, a qualitative case study was conducted on an SME in the wine industry of the Western Cape that was in the process of selecting an ERP system. Data were collected by critically analysing and reviewing documents, conducting direct observations of requirements analysis meetings and interviewing participants purposefully selected for the study (Chapter 3). Five major themes emerged from the analysis of the collected data and from this a total of 14 selection factors are identified (Chapter 4). These results largely corroborate existing selection factors from the literature and allows ideas proposed by various authors to be expanded on. In this way, a theoretical foundation is laid for the development of an ERP system selection model for SMEs in the Western Cape wine industry in future research (Chapter 5). The contribution of this research lies in the emphasis it places on the different benefits and shortcomings present in each quadrant of the proposed model and the explanation it provides for how this influences a selection factor trade-off that is unique to each organisation and the industry it operates in. This insight can be used to direct the ERP system selection process.

Uittreksel

Ondernemingshulpbronbeplannings-sisteme Seleksie in die Wynindustrie van die Wes-Kaap: 'n Kwalitatiewe Gevallestudie

H.J. Wiid

Tesis: Magister in die Lettere en Wysbegeerte (Sosio-Informatika)

Desember 2011

Die geglobaliseerde besigheidsomgewing van die 21ste eeu is 'n komplekse ruimte waarbinne organisasies moet navigeer. Daarom wend organisasies hulle toenemend tot informasie- en kommunikasietegnologie (IKT), en veral ondernemingshulpbronbeplannings (OHB)-sisteme, in 'n poging om hierdie arena se uitdagings en vereistes wat deur toenemende interverbinding en -afhanklikheid meegebring word die hoof te bied. 'n OHB-sisteem dra die belofte van 'n uniforme integrasie van besigheidsprosesse wat deur 'n enkele besigheidsagtewareprogrammatuur bestuur kan word. Dit kan aangewend word om mededingendheid te bevorder en om bestuurders by te staan om hul organisasies strategies te posisioneer vir die toekoms.

Dit is veral van toepassing in die geval van klein- tot medium-grootte ondernemings (KMOs) wat 'n groot en belangrike deel van die ekonomieë van verskeie lande verteenwoordig. Teen die begin van die vorige dekade het OHB-sisteemverkopers hul fokus van groot ondernemings na KMOs verskuif deur kleiner en goedkoper sagteware te ontwikkel wat spesifiek op hierdie marksegment gemik was. Navorsing het egter bewys dat hierdie ondernemings van hul groter eweknieë verskil in terme van grootte en industrie en dat dit 'n beduidende impak kan hê op die verwerwing van OHB-sisteme: KMOs ervaar dikwels ernstige hulpbrontekorte en kan nie die koste verbonde aan mislukte OHB-sisteemimplementering bekostig nie. Gevolglik raak dit toenemend belangrik dat hierdie ondernemings 'n behoorlike OHB-sisteemseleksieprosedure volg, voordat skaars en onvervangbare hulpbronne aan die implementering van dié sagteware bestee word.

Die doel van hierdie tesis is om die grootte- en industrie-spesifieke faktore wat 'n belangrike rol gedurende OHB-sisteemseleksie speel te definieer en te beskryf (Hoofstuk 1). OHB-sisteemseleksiefaktore in die literatuur is opgesom en saamgevat in 'n omvattende

raamwerk wat die uitvoering van die studie gerig het (Hoofstuk 2). 'n Kwalitatiewe gevallestudie is gevolglik uitgevoer op 'n KMO in die Wes-Kaapse wynindustrie wat besig was om 'n OHB-sisteem te selekteer. Data is ingesamel deur dokumente krities te analiseer en te hersien, deur direkte observasies van behoefte-analise-vergaderings te maak en onderhoude te voer met deelnemers aan die studie, wat spesifiek vir hierdie doel geselekteer is (Hoofstuk 3). Vyf prominente temas en 'n totaal van 14 seleksiefaktore is vanuit die analise van die data bepaal (Hoofstuk 4). Hierdie resultate bevestig grotendeels bestaande seleksiefaktore in die literatuur en fasiliteer die verdere uitbou van bestaande idees van verskeie outeurs. Op hierdie manier word 'n teoretiese grondslag vir die ontwikkeling van 'n model vir OHB-sisteemseleksie in toekomstige navorsing gelê (Hoofstuk 5). Die bydrae van hierdie navorsing lê in die klem wat dit plaas op die verskillende voor- en nadele teenwoordig in elke kwadrant van die voorgestelde model en in die verduideliking van die impak daarvan op 'n uitruiling van seleksiefaktore wat uniek is aan elke organisasie en die industrie waarin dit werkzaam is. Hierdie insig kan uiteindelik gebruik word om die OHB-sisteemseleksieprosedure te rig.

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Any form of research should not just be measured by the final product delivered, but also by the process involved in creating that product. The successful completion of a research project is by no means a trivial feat and can seldom be attributed solely to the person whose name appears on the document title page. I would, therefore, like to take this opportunity to humbly thank each and every person who contributed directly or indirectly to make this document what it is.

Firstly, a word of thanks and appreciation is extended to my supervisor, Daniel le Roux, without whose guidance and assistance I would never have been able to complete this project. It has been said that a good supervisor makes all the difference and this document is a testament to that. In this regard I also want to single out two individuals, Richard Barnett and Marietjie Vos, who assisted with the technical and linguistic editing of this document respectively. Your time and effort devoted to this document are greatly appreciated.

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Nomenclature

AHP	Analytic Hierarchy Process
ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variance
ANP	Analytic Network Process
BOM	Bill of Materials
CEO	Chief Executive Officer
CF	Critical Factor
CPPP	Community Public Private Partnership
CSF	Critical Success Factor
DEA	Data Envelopment Analysis
DGB	Douglas-Green-Bellingham
DMU	Decision-making Unit
DTI	Department of Trade and Industry
EAT	Enterprise Acquisition Team
ERPAP	Enterprise Resource Planning Acquisition Process
EU	European Union
EUC	End-user Computing
GDP	Gross Domestic Product
GLM	General Linear Model
HACCP	Hazard Analysis and Critical Control Point

- ICPS Information Centre Product Specialist
- ICT Information and Communication Technology
- IPW Integrated Production of Wine
- IS Information Systems
- ISO International Organisation for Standardisation
- IT Information Technology
- KWV Koöperatiewe Wijnbouers Vereniging van Zuid-Afrika Bpkt.
- MIS Management Information System
- MRP II Manufacturing Resource Planning
- MS Management System
- NAMAC National Manufacturing Advisory Centre
- OFS Swiss Office of Statistics
- OIV International Organisation of Vine and Wine (Organisation Internationale de la Vigne et du Vin)
- RFI Request for Information
- RFP Request for Presentation
- SAWIS South African Wine Industry Information & Systems
- SEDA Small Enterprise Development Agency
- SLA Service-Level Agreement
- SMME Small Medium and Micro-Enterprise
- SSM Soft Systems Methodology
- WIS Wine Information Systems

Chapter 1

Introduction

1.1 Background and motivation for the study

Today's business environment is challenging. Increases in market globalisation and resultant organisational interdependence have led to the transformation of the foundations on which global economic performance and competitiveness are built (Dutta & Evrard, 1999, p. 242)¹. Organisations find themselves under increased pressure to make the most of their limited resources, but to remain globally competitive at the same time. If this is not already challenging enough, the economic downturn of 2008 has prompted most organisations to further reduce their number of skilled staff and impose severe budget constraints. If an organisation is going to survive, and thrive, in this environment, it will need to find more effective and innovative ways of utilising its resources.

This is especially the case for small to medium-sized enterprises (SMEs) in South Africa. It is estimated that there are between 1.6 million and 3 million small, micro and medium-sized enterprises in the country (Berry, von Blottnitz, Cassim, Kesper, Rajaratnam, & van Seventer, 2002, p. 13). These enterprises contribute towards 27,4% of employment and 29% of South Africa's gross domestic product (GDP) (Ntsika² quoted in Berry et al., 2002, p. 25-28). SMEs face numerous challenges that threaten their economic

¹For the sake of remaining consistent, page numbers are provided next to sources where references were made to specific sections/quotations only. Page numbers have been omitted in cases where the entire source or significant sections thereof are referred to. Also, the page numbers provided at the end of each source reference in the bibliography indicate the specific page on which the source is referred to.

²These numbers vary depending on the sources consulted. Berry et al. (2002, p. 13) used a combination of different sources, among which the Ntsika Enterprise Promotion Agency was the most prominent. This agency was an initiative founded the South African Department for Trade and Industry (DTI). Its aims were to "render an efficient and effective promotion and support service to small, medium and micro-enterprises (SMMEs) in order to contribute to equitable economic growth in South Africa" (Department of Trade and Industry, 2006). As of 2004, the Ntsika Enterprise Promotion Agency merged with the National Manufacturing Advisory Centre (NAMAC) and the Community Public Private Partnership Programme (CPPP) to form the Small Enterprise Development Agency (SEDA) (Department of Trade and Industry, 2004). As a result, all attempts to locate primary resources concerning the Ntsika Enterprise Promotion Agency were unsuccessful and secondary sources had to be used instead.

performance and competitiveness: a lack of access to finance and educated staff, the rising cost of production; dealing with economic variables and the market; crime; corruption; labour regulations, and poor infrastructure, amongst others (Olawale & Garwe, 2010, p. 730-732).

SMEs in the wine industry of the Western Cape are particularly vulnerable. In addition to the aforementioned general problems, enterprises in the wine industry are facing unique context-specific challenges. A survey recently conducted by PriceWaterhouseCoopers (2010) identified a number of these that are likely to affect harvests and exports in years to come: inadequate human resource practises; a lack of proper supply chain management; unpredictable weather patterns; increasing costs of production; decreasing domestic wine consumption, and a stronger Rand.

To deal with the complexity of these challenges and increase global competitiveness, it has been suggested that SMEs adopt some form of enterprise resource planning (ERP) system³ (Malhotra & Temponi, 2010, p. 28). ERP systems have traditionally been designed with larger organisations in mind. As this market segment became saturated at the turn of the decade, ERP vendors started focusing their attention on SMEs (Monk & Wagner, 2009, p. 199). However, smaller organisations have unique organisational and business characteristics that set them apart from larger corporations. This in turn has implications for ERP system development and poses a problem for ERP system diffusion in smaller organisations (Buonanno, Faverio, Pigni, Ravarini, Sciuto, & Tagliavini, 2005, p. 386).

It therefore comes as no surprise that most of the research conducted in this academic field focuses on ERP system implementation and post-implementation issues, while neglecting the ERP system selection process (Verville & Halington, 2002b, p. 189; Verville & Halington, 2002a, p. 206-207). The acquisition of an ERP system, however, differs from other software acquisitions in that it impacts the strategic position of an organisation (Malie, Duffy & Van Rensburg, 2008, p. 18). For this reason it is important to examine all the dimensions and implications of such a decision before the committal of crucial resources by an organisation (Verville & Halington, 2003, p. 586). This is of particular relevance as most SMEs do not follow a proper selection procedure and make ERP system decisions without first properly considering the implications and aligning ERP systems with the organisations' goals (Ganapathy & Raju, 2008, p. 193). Smaller organisations are less likely than larger organisations to survive a failed ERP implementation, given their general lack of resources and technical and human capabilities (Muscatello, Small & Chen, 2003, p. 851; Fisher, Kiang, Fisher & Chi, 2004, p. 38). Against this background, the aim of this research is to explore the problematic area of ERP system selection for SMEs within a particular industry. Moreover, it focuses on defining and describing a set

³ERP system in the context of this study refers specifically to the software system and excludes references to underlying technical hardware components.

of size-specific and industry-specific ERP system selection factors to form part of a proper selection approach. This can assist an SME in the wine industry of the Western Cape to select the ERP system product on the market that is best suited to its unique needs.

The purpose of this chapter is to present an overview of the research conducted in this study (Bui, 2009, p. 99). The outline of the chapter is as follows: Firstly, section 1.2 defines and describes the research problem. Secondly, in section 1.3 the purpose of the study is presented. Thirdly, the primary and secondary research questions are stated in section 1.4. Following this is, section 1.5 provides an explanation of the research design chosen to answer the research question posed. Next, section 1.6 introduces the reader to the units of analysis chosen for the case study research design. Section 1.7 reflects on the limitations of the research design. Section 1.8 places the study within the relevant research tradition, while section 1.9 focuses on the role the researcher played in the context of this study. Important terminology used is defined in section 1.10. Section 1.11 indicates the significance of this study for both academia and the industry. Finally, section 1.12 discusses the ethical considerations reflected on.

1.2 Statement of the problem

An SME in the wine industry of the Western Cape has difficulty selecting an ERP system as a result of its size-specific and industry-specific constraints.

SMEs have unique characteristics which place certain expectations on the ERP system to be selected. Malhotra & Temponi (2010, p. 30) summarise the literature on this as follows: Small businesses usually have a specialised product in a niche market which needs to be delivered to the market place in the fastest time possible; SMEs are easily influenced by external market forces; geographical location plays a significant role with regards to organisational culture; close and informal communication exists between employees and management; various individuals perform multiple job functions and a rapid response to market needs is seen as a vital component. On the whole, Malhotra & Temponi (2010, p. 30) conclude that should an ERP system be developed with these characteristics in mind, a better fit with organisational requirements could be achieved.

Smaller organisations are also unique in their information-seeking practices. Taking the lead from various authors⁴, Lang, Calantone & Gudmundson (1997, p. 12) argue that SMEs differ from larger organisations in the following ways: a lack of (or less sophisticated) management information systems (MISs); making information-gathering the responsibility of one or two individuals, instead of that of top management; fewer resources available for information gathering, and in terms of the general quality and quantity of information

⁴Kagan, Lau & Nusgart (1990); Hambrick (1981); Golde (1964); Pearce, Chapman & David (1982).

in the organisations. Common problems experienced by SMEs when selecting ERP software also include: a limited number of vendors that have direct implications on the cost of the software; difficulties in choosing between vendors of different sizes; unsatisfactory levels of customisation, and a hesitation by vendors to disclose confidential but helpful information such as the source code (Erpwire, 2010).

Ein-Dor & Segev (1978, p. 1070-1072) propose that MISs⁵, such as ERP systems, are less likely to be successfully implemented in SMEs due to short organisational time frame problems and a general lack of maturity on the part of these businesses. Consequently, SMEs should consider different criteria when acquiring ERP systems. Adaptability, flexibility, short implementation time, lower costs and a good fit with business procedures are, amongst others, some of the important factors that play a role in their decision (Bernroider & Koch, 2001, p. 253). Moreover, Kagan et al. (1990, p. 36) state that SMEs might have different computing needs that are unique to the industry they operate in. Even more specifically, Kimberly (1976, p. 593-594) argues that each organisation may possibly have different individual requirements, further complicating the selection of an ERP system.

1.3 Purpose of the study

The purpose of this study is to define and describe the size-specific and industry-specific factors that influence ERP system selection by an SME within the wine industry of the Western Cape.

As has been explained in the previous section, SMEs experience problems when selecting and implementing ERP systems. These problems differ between SMEs operating in different sectors of the economy. Defining and describing a set of factors specific to SMEs in the wine industry may ensure a more successful selection of ERP systems before the committal of money, time and other scarce resources by these organisations. This may equip SMEs to face the challenges of the globalised wine industry, thereby increasing their importance as drivers of economic growth and job creation in the Western Cape and South Africa.

⁵According to Laudon & Laudon (2005, p. 46), MISs can be defined as “a specific category of information systems serving management-level functions”. This is done by providing managers with planning, controlling and decision-making functionalities (Laudon & Laudon, 2005, p. 47). Given the significant impact an ERP system has on an organisation and the extent to which managers, especially in smaller organisations, rely on these systems to perform their various duties, ERP systems in the context of this study are regarded as MISs. This is consistent with the views expressed by seminal authors in the field such as Laudon & Laudon (2005), O’Brien & Marakas (2008) and that of various academic journals in the field of Information Systems, in particular the Journal of Management Information Systems in which a number of articles on ERP research are featured yearly.

1.4 Research questions

1.4.1 Primary research question

What are the size-specific and industry-specific factors an SME in the wine industry of the Western Cape considers to be important when selecting an ERP system?

The aim of this research is to identify and describe the most significant size-specific and industry-specific factors that play a role in the selection of an ERP system by an SME in the Western Cape wine industry. With this purpose in mind, ERP system selection factors were identified from the literature and from the chosen case study. These were then grouped together to lay the foundation for the development of a ERP system selection model for SMEs in this particular industry.

1.4.2 Secondary research questions

1.4.2.1 Why is it important for an SME to focus on ERP system selection as opposed to implementation only?

The first secondary question this thesis attempts to answer deals with the importance of selection as opposed to implementation only. As has been pointed out in section 1.1, the selection process has for the most part been ignored by researchers. However, given the resource constraints SMEs face, it is important for these organisations first to thoroughly consider the type of ERP system best suited to their needs before investing valuable resources directly in implementation. This will be further explained in chapter 2.

1.4.2.2 What are the ERP system selection factors in existing literature?

Various authors⁶ have made a case for the importance of including ERP system selection factors as part of a well-defined ERP system selection approach. These factors cover a broad range of topics, from users of the ERP system, to costs, ERP vendors, consultants and implementation partners used, the industry the organisation operates in and the size of the organisation. The level of significance awarded to each of these factors also differs depending on whether they are emphasised explicitly, are highlighted implicitly as part of a selection methodology or form part of the findings of the study. The factors mentioned were used to develop a framework for the analysis of data from the case study.

1.4.2.3 What are the size-specific factors that influence ERP system selection?

⁶Al-Mashari, Al-Mudimigh & Zairi (2003); Verville & Halington (2002a); Verville, Bernadas & Halington (2005); Baki & Cakar (2005); Ehie & Madsen (2005); Nah, Lau, & Kuang (2001); Montazemi, Cameron & Gupta (1996); Palvia & Chervany (1995), amongst others.

A survey of the literature revealed a host of ERP system selection methodologies that specifically focus on SMEs. Each of these methodologies emphasises different factors that influence the adoption of ERP system by SMEs. Through a combination of these, a list of factors were compiled that is size-sensitive to the unique needs and characteristics of SMEs.

1.4.2.4 What are the wine industry-specific factors that influence ERP system selection?

The wine industry forms part of the wider agricultural industry in South Africa. The nature of wine-making, however, necessitates the use of certain processes and procedures that are unique to this industry. This in turn imposes certain demands on the software used by the organisation to automate and manage these processes. The case study will attempt to identify these unique processes and procedures and the selection factors that arise from them.

1.4.2.5 To what extent do the identified factors help to ensure a better fit between SME requirements and ERP system offerings?

It has been argued in the literature⁷ that no single ERP system will fulfil all the needs of a particular organisation and that a mismatch may exist between the unique requirements of the organisations and the functionalities a particular ERP system is able to offer. Various options therefore exist to help tailor existing ERP system packages to ensure a better fit with organisational requirements (Brehm, Heinzl & Markus, 2001, p. 4). This research proposes the use of SME size-specific and wine industry-specific factors as part of a proper ERP systems selection approach to achieve this goal. This in turn reduces the need for expensive tailoring exercises.

1.5 Research design

A qualitative research design methodology was selected to collect the necessary data to answer the research question posed in this study. The approach used was two-fold: Firstly, a literature study was conducted which critically reviewed and analysed existing ERP selection methodologies. Specific attention was paid to selection methodologies which focus on SMEs. It was noted that none of the existing methodologies collectively address the SME size-specific and wine industry-specific factors that influence ERP system selection.

The second part consisted of a single case study conducted on an SME in the wine industry of the Western Cape. This organisation was in the process of selecting a new

⁷Kumar & Van Hillegersberg (2000, p. 25); Davenport (1998, p. 4-9).

ERP system. Data⁸ were gathered by means of direct observations during five requirements analysis meetings and semi-structured in-depth interviews with ten key stakeholders within the organisation. As a means of validating the data thus obtained, four external industry experts were also interviewed. This group consisted of three chief executive officers (CEOs) of prominent ERP system or wine information systems (WIS) vendors and one industry consultant who focuses specifically on ERP system selection for the wine industry. In both of these instances the interviews consisted of open-ended questions and lasted between 30 and 90 minutes. Examples of the questionnaires used are presented in Appendices A and B. The interviews were transcribed and sent back to the interviewees for verification. Further data triangulation was performed using public and private company documents and reports. Accordingly, data were analysed using three methods of analysis: coding, pattern coding and memoing.

A case study approach was selected as the most suitable means to investigate the research problem posed. The rationale for selecting a single case study was to identify a “typical” or “representative” case of an SME in the wine industry of the Western Cape (Yin, 2009, p. 48). Within this context, the objective was to “capture the circumstances and conditions of an everyday or commonplace situation” (Yin, 2009, p. 48). This case study approach allowed the researcher to “retain the holistic and meaningful characteristics” of the organisational and managerial processes of the relevant SME while at the same time exploring the “experiences of the average person or institution” (Yin, 2009, p. 48). According to Yin (2009, p. 11) the strength of this particular type of research design is its ability to deal with a variety of different types of evidence, which makes it ideally suited to investigate the proposed research question. Given the lack of research conducted on ERP systems selection in the past, Verville & Halington (2002a, p. 207) further justify the use of this design on the assumption that it might “unveil a multitude of factors and dimensions that make the acquisition of ERP software such a complex process”.

1.6 Units of analysis

For the purpose of this study, an embedded single case study design (Yin, 2009, p. 46) was selected. This firstly entailed the selection of a typical SME operating in the wine industry of the Western Cape as the main unit of analysis. Furthermore, based on the interviewees selected, four subunits of analysis were defined: Financial, Middle-Management, Technical and Top-level Management. This was done with the intention of adding “significant opportunities for extensive analysis, enhancing the insights into the single case study” (Yin, 2009, p. 52-53). At the same time, the researcher was aware of the possible risk of

⁸The word “data” in the context of this thesis is henceforth regarded as plural (from the singular “datum”). This is consistent with the views contained in the online version of the Oxford English Dictionary (2011).

deviation from the original “case” posed by over-analysis of the subunits (Yin, 2009, p. 53). With this in mind, the researcher proceeded to take care, by means of the research design and data analysis strategies, not to allow the organisation studied to become the “context” of the study, but to ensure that it remained the “target” throughout (Yin, 2009, p. 52).

1.7 Limitations of the research design

Yin (2009, p. 14-16) describes a number of traditional prejudices and limitations of the case study method that are also applicable in this instance. Bui (2009, p. 115) states that the best way to deal with these limitations is to acknowledge them upfront and explain their possible impact on the findings of a particular study. The first limitation typical of studies of this nature is the general lack of rigour in previous case study research (Yin, 2009, p. 14). According to Yin (2009, p. 14), this implies that the case study researcher might not have followed “systematic procedures” or might have allowed “biased views to influence the direction of the findings and conclusions” of the research. With regards to this particular study, and as explained in section 1.3, various methods were used to gather and validate the data obtained. As recommended by Yin (2009, p. 101) the validity and reliability of the research process were further improved using three different sources of evidence namely: interviews, direct observations and documentation. The benefits associated with using multiple sources were maximised by following “three principles of data collection”: using multiple sources of evidence, creating a case study database and maintaining a chain of evidence Yin (2009, p. 114-124).

Arguably most important for this study is the limitation the case study design places on scientific generalisation. Only a single case study was conducted, which may lead to concerns regarding the external generalisability of the findings to similar organisations in the wine industry of the Western Cape and other wine producing areas in South Africa or the world. However, Yin (2009, p. 15) argues that case studies are generalisable to theoretical propositions and not entire populations or universes: “In this sense, the case study...does not represent a ‘sample’ and in doing a case study, your goal will be to expand and generalise theories and not to enumerate frequencies”. Thus, an attempt was made to increase the internal generalisability of the findings of this case study through making explicit the linkages between research findings and existing knowledge (Babbie & Mouton, 1998, p. 283). In keeping with this, the foundations for the future development of a theoretical model for ERP system selection by SMEs in the wine industry are proposed.

The third and final limitation concerned is that of the time span over which the case study was conducted, as well as the large amount of documentation generated (Yin, 2009, p. 15-16). The ERP system selection procedure followed by the organisation was studied

up until phase three, which resulted in a time span of approximately eight months from July 2010 to February 2011. By limiting the study in this way, the researcher was able to keep the time span realistic and to reduce the amount of documentation produced to only that necessary to answer the research question posed. On the whole, the three limitations mentioned in this section should be assessed in the light of the interpretivist and qualitative context in which this research was conducted.

1.8 Research tradition

According to Creswell (2009, p. 5-6), the philosophical worldviews underlying research have an impact on the conducting thereof and should therefore be acknowledged and made explicit by the researcher. Based on this recommendation, the researcher located this qualitative study within the interpretivist research tradition with an emphasis on exploration. Unlike the positivist tradition, researchers working within the interpretivist paradigm do not believe that the goal of scientific research is to uncover the truth (Henning, Van Rensburg & Smit, 2004, p. 19). Rather, the aim of interpretivist research is to “hold steadfastly to the goal of getting it right about reality or multiple realities” even if this means never being able to achieve this goal (Henning et al., 2004, p. 20). Within this tradition it is believed that “different viewpoints construct the world through different processes of observation”, implying that a single scientist or scientific method can never objectively capture the world, but only deliver approximations of the truth (Henning et al., 2004, p. 20).

Researchers rely on these different and multiple viewpoints to achieve their goal and believe that reality can only be “imperfectly grasped” as a result of the influence of biases and theoretical viewpoints on the work of human beings (Henning et al., 2004, p. 20). The researcher understands phenomena and events “through the mental processes of interpretation which are influenced by and interact with the social context” (Henning et al., 2004, p. 20). Moreover, Henning et al. (2004, p. 20) point out that the knowledge of the researcher is constructed through “descriptions of people’s intentions, beliefs, values and reasons, meaning-making and self-understanding”. Based on these assumptions, it is expected of a researcher conducting research in this paradigm to exhibit sensitivity towards the “role of the context” to assist him/her to discern in what manner individuals make meaning of their world (Henning et al., 2004, p. 20).

This worldview supports the purpose of this study and has methodological implications for its research design (Henning et al., 2004, p. 21-22). In this instance, enquiry took place in a natural setting (i.e. an SME in the wine industry of the Western Cape) “in order to collect substantial situational information” (Henning et al., 2004, p. 20). Methods, such as unstructured observations, open-ended interviewing and qualitative data analysis,

executed in a principled way, were used to “capture ‘insider’ knowledge that is part of an interpretivist methodology” (Henning et al., 2004, p. 20). Furthermore, the researcher is also aware of the influence his biases, values and theoretical viewpoints, as well as that of the participants, may have had on the interpretation of reality and the findings of the study (Henning et al., 2004, p. 20).

1.9 Role of the researcher

In keeping with the assumptions of the interpretivist tradition and qualitative research paradigm, Creswell (2009, p. 177) further states that it is important for researchers to reflect on their role in a study. This includes identifying “biases, values, personal background” and other factors which may inadvertently have influenced the researcher’s interpretation (Creswell, 2009, p. 177). For the purpose of this study, the researcher did not foresee any problems concerning his own personal background (gender, culture, socio-economic status or other personal information) and how this could have influenced the data obtained. However, the fact that the researcher has never worked in an SME or has no significant personal experience with ERP systems, could mean that his interpretation may be biased towards the literature studied on these topics, and in particular, existing ERP system selection factors identified by other researchers.

With regards to the participants and research site selected, entry was gained to the setting through a rapport built up with the information and communication technology (ICT) Director. Together with other stakeholders, the ICT Director conducted the requirements analysis meetings and assisted the researcher in securing interviews with various participants. His influence and views may therefore have had an impact on the researcher’s interpretation of these events. To overcome this limitation, multiple strategies of validity were employed to ensure the accuracy of the findings reported. This is further discussed at length in chapter 3. Furthermore, the researcher followed procedures to ensure the rights of the participants in the study are protected and ethical issues are addressed. This is further explained in section 1.12.

1.10 Definitions

1.10.1 SME: Small to medium-sized enterprise

At present, there is no general agreement on what constitutes an SME in the wine industry in South Africa (Whitehead, 2010). Consequently, the researcher decided to make use of the Department of Trade and Industry (DTI) guidelines for SMEs as derived from the

National Small Business Act of South Africa (1996)⁹. According to the Act (1996), a small business is defined as “a separate and distinct business entity, including cooperative enterprises and non-governmental organisations, managed by one owner or more”. Within the agricultural sector, this includes businesses with a total number of full-time employees between 50 and 100 and with a total annual turnover equal to or less than R4 million. The organisation selected for this study currently employs 84 full-time employees and was regarded as a medium-sized enterprise for the purpose of this study. It was further determined that if this definition were applied to the wine industry as a whole, most of the wine producers in the Western Cape can be classified as SMEs.

1.10.2 ERP: Enterprise resource planning

“Enterprise resource planning” is a phrase first coined by the Gartner Group in the 1990s (Hicks & Stecke, 1995, p. 13). It evolved out of materials requirements planning (MRP) systems of the 1960s and manufacturing resource planning (MRP II) systems from the 1980s (Jacobs & Weston, 2007, p. 357). According to Klaus, Rosemann & Gable (2000, p. 142), the concept of ERP systems “can be viewed from a variety of perspectives”. Markus, Axline, Petrie & Tanis (2000, p. 245) define ERP systems on a basic level as “commercial software packages that enable the integration of transaction-oriented data business processing throughout an organisation”. According to Klaus et al. (2000, p. 143), this is made possible by means of “an underlying integrated database that stores master and transactional data in a consistent way and with controlled redundancy”. ERP systems are able to support functions across the business spectrum: accounting, finance, manufacturing, human resource management, logistics and marketing, amongst others (McGaughey & Gunasekaran, 2007, p. 24). Further characteristics of ERP systems include: integration of organisation data; the fact that software packages are to be bought or leased from ERP system vendors; the ability to offer built-in generic best business practises for organisations; the need for some form of assembly or customisation required, and the fact that they are evolutionary in nature (Markus & Tanis, 2002, p. 176-179).

Moreover, Davenport (1998, p. 2) defines enterprise systems¹⁰ on a conceptual level as more than just commercial software, as they “promise the seamless integration of all the information flowing through a company”. Arguably the biggest benefit of these systems is that they assist managers in managing organisation-wide business processes: “ERP software supports the efficient operation of business processes by integrating throughout a business tasks related to sales, marketing, manufacturing, logistics, accounting and staffing” (Monk & Wagner, 2009, p. 1). McGaughey & Gunasekaran (2007, p. 24) argue that this is achieved by “making the right information available to the right people at

⁹Amended in 2003.

¹⁰Davenport (1998) and Laudon & Laudon (2005) equate enterprise systems to ERP system.

the right time". Viewed in this manner, an ERP system is often regarded as "the key element of an infrastructure that delivers a solution to a business" (Klaus et al., 2000, 142). Various authors¹¹ further emphasise the strategic implications an ERP system can have on an organisation and how this adds to its complexity and distinguishes it from other types of software¹², often necessitating an organisation to develop unique approaches when dealing with this type of software.

1.11 Significance to the field

1.11.1 Value for research

Various authors¹³ acknowledge the general lack of research focusing on ERP system selection¹⁴. This is especially true for selection methodologies and selection factors aimed at SMEs. Furthermore, Ponte & Ewert (2009, p. 1639-1640) note that the wine industry has also been "the subject of relatively limited academic literature". To the knowledge of the researcher, at the time of conducting the research, no evidence existed of research done on software selection and more specifically ERP system selection in the wine industry of the Western Cape. Therefore, the value of this research for academics lies in the positive contribution it hopes to make to the scientific development of both of these research fields.

1.11.2 Value for practice

SMEs and the wine industry constitute two important parts of the economy of South Africa and the Western Cape region in particular (Berry et al., 2002, p. 11; Ponte & Ewert, 2009, p. 1639). However, a recent study conducted by Olawale & Garwe (2010, p. 730) indicates that approximately 75% of start-up SMEs in South Africa fail to reach a level of maturity. The authors conclude that technology plays an important part in the development of these SMEs and assists them to become established firms.

Therefore, the practical value of this thesis lies in the insight it affords owners of SMEs in the wine industry who are contemplating the use of advanced forms of ICT, such as ERP systems, to improve the performance of their organisations. It has already been stated how crucial it is for these organisations to be able to make the right investment choices due to resource constraints and the nature of competitiveness and economic performance

¹¹Wei, Chien & Wang (2005, p. 49-51); Stefanou (2000, p. 989); Stefanou (2001, p. 207); Teltumbde (2000, p. 4510); Al-Mashari et al. (2003, p. 362); Elie & Madsen (2005, p. 554-555); Nah et al. (2001, p. 291); Ziaee, Fathian & Sadjadi (2006, p. 487); Verville & Halington (2002b, p. 196).

¹²Verville & Halington (2002a, p. 215); Stefanou (2001, p. 213); Luo & Strong (2004, p. 323-324).

¹³Ganapathy & Raju (2008, p. 194); Moon (2007, p. 241); Verville & Halington (2002a, p. 207); Kumar, Maheshwari, & Kumar (2002, p. 521).

¹⁴Some authors refer to this as part of "acquisition" or "adoption" processes. This is further explained in section 2.2.

in the current globalised business environment. It is anticipated that the findings of this study and future research conducted in this field can assist these organisations in achieving a better fit between their unique requirements and the offerings of available ERP system products on the market.

ERP system vendors have also expressed an increased interest in the SME sector over the last decade (Monk & Wagner, 2009, p. 32). Consequently, many ERP system vendors have developed products to meet the needs of smaller organisations (Monk & Wagner, 2009, p. 32). Nevertheless, implementing an ERP system is a complex endeavour, regardless of the size of the organisation, and the literature abounds with examples of failed or abandoned ERP system projects (Scott & Vessey 2000, p. 214; Scott & Vessey 2002, p. 74). In addition, the WIS market in South Africa is relatively small and currently has only one ERP vendor that caters for the collective needs of the industry. Based on the reasons provided here it is further anticipated that ERP system vendors (both within and outside the WIS market), as well as consultants may find the findings of this study of practical value to augment their existing business practices.

1.12 Ethical considerations

By making use of the outline provided by Babbie & Mouton (1998, p. 520-532), the researcher reflected on various ethical considerations during the planning and execution of this study. In this way, care was taken to strive for integrity and scientific objectivity by focusing on a number of ethical aspects. Firstly, participation in interviews and observations remained voluntary and the participants were so informed. Secondly, care was taken to ensure no research subjects were harmed, either directly or indirectly, during the gathering, analysis and reporting of data. Since data were gathered from identifiable individuals during the interviews, anonymity on an individual level could not be guaranteed. However, the organisation as a whole requested to remain anonymous and all possible traces that could lead to its identification were removed from the study and research notes. Furthermore, the researcher and the organisation came to the agreement that any information gathered would be treated as confidential. This was then communicated to the participants as part of the observation and interview protocol followed¹⁵. Following this, research subjects were also informed about the purpose of the study to prevent deception on the part of the researcher. Lastly, the limits of the findings obtained and the methodological constraints were made explicit and no data or findings were changed.¹⁶

¹⁵See chapter 3.

¹⁶See sections 1.3 and 5.7.

1.13 Chapter summary

The purpose of this chapter is to act as an introduction by giving the reader an overview of the research conducted. Section 1.1 provided the background and motivation for undertaking the study. Next, the problem statement was presented in section 1.2 and the purpose of the study explained in section 1.3. Based on this, a primary research question and five secondary research questions were posed in section 1.4. Following this, the research design chosen to collect and analyse data that would answer the research question was set out in section 1.5. Subsequently, section 1.6 described the units of analysis chosen for the case study design, while section 1.7 acknowledged the limitations and weaknesses in the research design and explained how they might have impacted on the findings of the study. In section 1.8, the study was placed within the interpretivist research tradition and the implications thereof for the research design were explained. Section 1.9 focused on the role of the researcher and the affects this may have had on the study's findings. The major subject terminology used was defined and described in section 1.10. The last two sections (1.11 and 1.12) respectively highlighted the significance of the study for research and practice, and reflected on the various ethical aspects considered during the planning and execution of the study. The next chapter presents a review of the most significant literature.

Chapter 2

Review of the Literature

2.1 Introduction

Running a competitive business in today's globalised business environment is challenging. Countless organisations have turned to ICT solutions and specifically advanced forms of ICT, such as ERP system, to assist them in dealing with these challenges. This is even more pronounced with resource-constrained SMEs. However, SMEs differ from their larger counterparts in ways which affect their selection of ERP software. Moreover, SMEs experience problems when selecting ERP systems as a result of size- and industry-specific factors. The purpose of this study is therefore to define and describe these SME-specific and industry-specific factors that affect ERP system selection by SMEs within the wine industry of the Western Cape.

The focus of this section is to review the literature for existing ERP system selection factors, specifically focusing on SMEs. It commences with section 2.2, which explains the disparity between what certain authors regard as “selection” and what others deem to form part of “implementation” in ERP literature. Following this, section 2.3 sets out the strategy that was used to conduct a document review and analysis of the literature using keywords and noting the most prominent and seminal authors in each regard. Next, section 2.4 summarises the explicit and implicit ERP system selection factors identified by various authors. The purpose of these studies is not to determine ERP system selection criteria per se, but they nonetheless reveal relevant information considered of importance for this study. Section 2.5 delimits the scope of the study by reviewing existing literature focusing specifically on the factors influencing ERP system selection and associated processes. Section 2.6 narrows the focus to ERP system selection in SMEs. Lastly, section 2.7 summarises the selection factors identified according to 18 broad categories, and synthesises these in a comprehensive table indicating the level of emphasis for ERP systems selection.

2.2 The disparity between “selection” and “implementation” in ERP literature

A review of the literature revealed a significant gap in research done in the field of IS evaluation and ERP system selection in particular. Moon (2007) conducted a review of ERP-related articles in prominent IS journals published from 2000 to 2006. The author came to the conclusion that these articles focused for the most part on issues related to ERP system implementation. However, a closer scrutiny of Moon’s analysis revealed that the definition of implementation employed included certain activities and processes (grouped under the subsection “Focused Stage”) categorised by other authors to form part of ERP system selection (Moon, 2007, p. 243).

Therefore, understanding the reasons for the gap in the literature requires an investigation into how different authors define the stages of the ERP system life cycle. Markus & Tanis (2002, p. 188-195) describe an organisation’s experiences with ERP system to move through four distinct phases, each associated with key activities: project chartering¹; the project²; shakedown³; onward and upward⁴. Various authors⁵ agree with this definition and regard numerous ERP decision and selection activities to form part of implementation processes.

In contrast to this, Daniel O’Leary (2000, p. 89-115) makes a more explicit distinction between ERP system selection and implementation. According to the author, the first two phases of an ERP life cycle constitutes the decision by an organisation to “go ERP” and “choosing an ERP” respectively, while implementation only follows at stage five and solely constitutes the physical installation and “going live” of the software. Santana, Serida-Nishimura, Morris-Abarca & Diaz-Baron (2002, p. 193-198) also make a clear distinction between the selection of the ERP system and its subsequent implementation as part of their case study of ERP system implementation at Almentos food company in Peru. In their study, various tasks and procedures, including the compilation of a project task team to oversee the project and the evaluation of the ERP system and vendor, preceded the implementation of the software (Santana et al., 2002, p. 194-195). Furthermore, Yusuf, Gunasekaran & Abthorpe (2004, p. 258-259) in their investigation of the implementation of an ERP system at Rolls-Royce, clearly distinguish between phases associated with setting the direction, planning and analysis and the physical implementation of the ERP system.

For the purpose of this literature review it was decided to focus mainly on literature

¹Characterised by decisions regarding funding and “business case and solution constraints” (Markus & Tanis, 2002, p. 189).

²Entails activities associated with getting the system and users “up and running”.

³Constitutes activities with the purpose to stabilise the ERP system and achieving normal operations.

⁴Maintaining the system and supporting the users.

⁵Umble, Haft & Umble (2003, p. 244-247); Ehie & Madsen (2005, p. 549), amongst others.

that specifically treats selection as a separate and preceding stage to implementation. The reasons for this, as expressed by various authors⁶, is based on the important role a proper selection methodology plays in an organisation, as well as the need for further research in this discipline sub-field. However, as limited research has been conducted in the field of ERP system selection, the researcher also reviewed literature that focus on ERP system implementation, acquisition and evaluation where deemed relevant to answer the research question of this study.

2.3 Strategy used for document review and analysis

A survey of existing literature was conducted using a number of keywords. The keywords used and most prominent authors in each category are listed in table 2.1.

Table 2.1: Strategy used for literature review

KEYWORDS	PROMINENT AUTHOR(S)
Goal-driven selection approaches	Lee & Xue (1999)
Risk-driven selection approaches	Scott (1999); Scott & Vessey (2000); Scott & Vessey (2002); Moselhi & Deb (1993)
Multidimensional selection approaches	Fitzgerald (1998)
Decision-oriented selection approaches	Lucas & Moore (1976); Kumar, Murphy & Loo (1996); Verville & Halington (2002); Bacon (2010); Santhanam & Kyparisis (1995)
TECHNICAL SELECTION APPROACHES	
Data envelopment analysis (DEA)	Lall & Teyarachkul (2006)
Goal-programming	Badri, Davis & Davis (2001)
Analytic network process (ANP)	Lee & Kim (2000)
Analytic hierarchy process (AHP)	Wei, Chien & Wang (2005)
FRAMEWORKS AND MODELS FOR ERP SYSTEM SELECTION	
A Comprehensive framework using fuzzy logic algorithms and internal value ranking	Wei & Wang (2004)
A Six-stage model for ERP acquisition	Verville & Halington (2003)
A Framework for ERP selection	Stefanou (2000)
ERP systems ex-ante evaluation framework	Stefanou (2001)
An ERP project evaluation framework	Teltumbde (2002)
Framework for customisation properties	Luo & Strong (2004)
FACTORS INFLUENCING ERP SYSTEM SELECTION	
Critical success factors in ERP implementation	Al-Mashari, Al-Mudimigh & Zairi (2003)
Qualitative influences and characteristics of the ERP acquisition process	Verville & Halington (2002b)

⁶Ballantine, Galliers & Stray,(1996, p. 130); Hecht (1997, p. 56); (Moon, 2007, p. 247).

Table 2.1: Strategy used for literature review

KEYWORDS	PROMINENT AUTHOR(S)
Critical success factors affecting ERP acquisition	Verville, Bernadas & Halington (2005)
ERP package-selection criteria	Baki & Cakar (2005)
Factors which account for variances in ERP implementation	Ehie & Madsen (2005)
Critical factors for successful ERP implementation	Nah, Lau & Kuang (2001)
Software package selection factors	Montazemi, David & Gupta (1996)
Factors influencing successful technological change	Palvia & Chervany (1995)
STUDIES FOCUSED ON ERP SYSTEM SELECTION IN SMES	
A Modular approach	Ziaee, Fathian & Sadjadi (2006)
ERP systems selection framework	Ganapathy & Raju (2008)
Package-selection factors	Chau (1995)
Perceptions regarding ERP implementation-related benefits	Equey & Fragnière (2008)
ERP system sourcing strategies	Sledgianowski, Tafti & Kierstead (2008)
Adoption of ERP systems by mid-size organisations	Van Everdingen, van Hillegersberg & Waarts (2000)
A data envelopment analysis approach	Fisher, Kiang, Fisher & Chi (2004)
ERP selection by medium-sized organisations in South Africa	Malie, Duffy & Van Rensburg (2008)

2.4 Summary of explicit and implicit selection factors

The aim of the research strategy is to locate and critically analyse studies that identify factors for ERP system selection. These factors can either be explicit⁷ or implicit⁸. Based on the results, studies are divided into two categories: secondary⁹ and primary importance. The studies of secondary importance do not specifically focus on identifying ERP system selection factors or determining ERP system selection in SMEs. However, they nevertheless reveal interesting (mostly implicit) selection factors relevant to this study. These findings are summarised in Appendix C. The purpose of the following two sections is to narrow the focus of the literature review by critically analysing exiting literature of primary importance.¹⁰

⁷As part of the aim and the findings of the study.

⁸As part of the selection approach used and implications drawn.

⁹Studies with an indirect focus on identifying ERP selection factors and ERP selection in SMEs.

¹⁰A research synthesis model was used to critically analyse the literature (Bui, 2009, p. 125). This model comprises ten components (Bui, 2009, p. 125-131). Step one entails providing an introduction about the topic of the study and defining new terminology. Following this is a statement of the purpose of the study and reference to the relevant authors. Step three describes the setting where the research was

2.5 Studies identifying ERP system selection factors

2.5.1 Al-Mashari et al.'s taxonomy of critical factors

Al-Mashari, Al-Mudimigh, & Zairi (2003) present a taxonomy of factors influencing ERP system implementation. The authors argue that ERP-related benefits can only be realised if technical and organisational imperatives are aligned and a reconciliation mechanism, “based on the principles of process orientation”, is established between them. The authors base the rationale for their taxonomy on the assumption that an ERP system will be implemented to support the various strategic, organisational and operational critical factors (CFs) of the organisation’s strategy as well as to assist in accomplishing various other multi-level CFs.

The proposed taxonomy is divided into three broad categories: setting-up, implementation or deployment and evaluation. Setting-up entails commitment by leadership and top management for the duration of the ERP system project, having a clear vision and mission for the project, and planning. Factors that are grouped under implementation, but are also relevant to ERP system selection in this instance include: ERP system package selection based on criteria defined by the organisation to match their requirements; a communication plan; open information policy; some form of business process re-engineering; project management; a project leader who is “capable in both strategic and tactical project management activities”; a comprehensive legacy system transition plan, and anticipation of cultural and structural changes to be brought about by the implementation of an ERP system.

Apart from these factors, Al-Mashari et al. (2003) also identify a number of important implications which are relevant to this study, such as alignment between the ERP system project strategic process, IT strategic process and the core business strategy. Implicated in this is the importance of a clear vision and the support and commitment of leadership and management in the organisation. In addition, the authors reiterate the importance of taking a strategic perspective on ERP system selection and implementation.

conducted, including the selection and demographic of the participants. Subsequently, the intervention implemented by the authors (where applicable) or the phenomenon explored is identified in step four. Step five focuses on the steps used to conduct the study. Step six presents the variables measured and how data were collected. The manner in which the data were analysed and the results of the study are presented in steps seven and eight respectively. The main conclusions and implications derived from the findings of the study are discussed in step nine. The tenth and final step addresses the limitations or weaknesses of the study.

2.5.2 Factors influencing the decision process according to Verville and Halington

In their study, Verville & Halington (2002b) identify qualitative influences and characteristics of ERP system acquisition processes (ERPAPs) in four organisations. A multiple case study approach was selected as the best means to conduct an in-depth investigation into the processes, critical issues and influences present in each case. The four client organisations were selected on the basis of the following criteria: Acquisition had a significant impact on the organisation and totalled several hundred thousand dollars or more; the package solution selected in each case was of a complex nature; the acquisition involved a new purchase and had recently been completed. These four organisations were operative in four different industries, namely air transport, energy (gas and electricity), telecommunications and retail (household furniture).

The authors collected data by means of face-to-face interviews with key stakeholders who played a significant role in the acquisition process. A total of 19 individuals were interviewed and the interviews lasted one hour and 15 minutes. The interview protocol entailed using open-ended questions in the interviews to allow for flexibility and in-depth enquiry. Each interview was opened with the question: “Describe in your own words what you perceived as the key characteristics of the ERP acquisition process”. Follow-up questions were then used. Validity of the data were ensured by means of recording and transcribing the interviews and member checks were performed. Where deemed necessary, follow-up questions were asked to clarify ambiguities and re-confirm information. The last part of data triangulation consisted of obtaining feedback from individuals independent of the study.

Verville & Halington (2002b) made use of Webster and Wind’s “general Model of Organisational Buying Behaviour” (Webster & Wind, 1972) to classify the influences according to four factors, namely environmental, organisational, interpersonal and individual. The following environmental factors were noted in each of the cases: physical influences¹¹; technological influences¹²; cultural influences¹³; political influences¹⁴, and legal influences¹⁵.

A number of organisational influences were also identified in the study (Verville & Halington, 2002b). These include: The use of project management techniques¹⁶; user buy-in; external vendor and product references; the importance of a single vendor solu-

¹¹Geographical location of vendor and primary customers.

¹²Replacing obsolete systems, changing to a client server environment, performance of the ERP solution on a wide area network.

¹³Organisational culture.

¹⁴User buy-in.

¹⁵Code ownership, performance guarantees.

¹⁶Due to the absence of a formalised approach to deal with this type of acquisition.

tion¹⁷; the role of new management¹⁸, and economics¹⁹. Group and individual influences which impacted the acquisition process are acquisition group composition²⁰, individual leadership²¹, past experience²², and the influence of the steering committee of board of directors.

In addition to the four factors and influences the authors explicitly identified, a number of implications are also raised which are important to this study. Firstly, due to the absence of a formalised procedure in the organisations for dealing with ERP system acquisitions, each organisation created one itself. Secondly, the creation of a “partnership” approach with the vendor and the user communities led to a more open and participatory relationship with both key stakeholders. Thirdly, a long-term relationship with the vendor was also considered a key factor in the decisions of the four organisations. Lastly, full user buy-through was ensured through significant user involvement.

2.5.3 Verville et al.’s ten critical success factors that affect ERP system acquisition

Adding to the previous study, Verville, Bernadas, & Halington (2005) present a discussion of ten critical success factors (CSFs) which affect ERP acquisition in organisations. Three organisations, identified in the previous study, were selected to execute a multiple-case design. These organisations were selected using the same five criteria of the previous study. Semi-structured interviews were held with 15 individuals, each interview lasting approximately one hour and 15 minutes. Each interview started with the following questions: “In your opinion, what were the CSFs for the acquisition process for ERP software?” Furthermore, open-ended questions were used and augmented with follow-up questions. Interviews were audio-taped, transcribed and sent back for verification and accurate interpretation by the informants (member checks). Follow-up questions were asked if information needed to be reconfirmed or clarified.

The authors proceeded to group the CSFs identified from the study into two main categories, namely factors related to the acquisition process and factors related to people within the process. The first category include the following CSFs: planned and structured process²³; rigorous process²⁴; definition of all requirements²⁵; establishment of selec-

¹⁷As opposed to a “best of breed” compilation of different modules from different vendors.

¹⁸Applicable in one of the cases.

¹⁹One of the organisations had to make use of a smaller vendor due to their smaller size and the associated cost of a system from a large vendor.

²⁰Interdisciplinary.

²¹By project manager or project director.

²²On both a group and an individual level.

²³Measure different activities and issues related to acquisition.

²⁴To ensure a better implementation.

²⁵Current and desired organisational needs and functional areas to be impacted.

tion and evaluation criteria, and accurate information²⁶. The second category comprises factors related to people within the process. These include: clear and unambiguous authority²⁷; careful selection of the acquisition team members²⁸; a “partnership approach”²⁹; user participation³⁰, and benefits obtained from user buy-in³¹. As with the previous study, many of these factors can be regarded as important to this research. Moreover, the emphasis placed on the importance of following a structured process for ERP system acquisition, the role human users of the system play in the process and the credibility of information are considered to be especially relevant.

2.5.4 Package-selection criteria defined by Baki and Cakar

The purpose of the study undertaken by Baki & Cakar (2005) is to determine the most important criteria used in ERP system selection by 55 Turkish manufacturing firms. These firms operate in a variety of industries: automotive (highest number), textiles, metals, cement, pharmaceuticals, petro-chemistry, food, metal goods, electric-electronic communication and other industries. At the time the study was conducted, 22 companies made use of their own manufacturing software program, while 18 had no company-wide program related to manufacturing in operation.

The methodology employed by the authors consisted of two phases. In phase one, criteria for ERP system selection were identified from existing literature and used to compile a questionnaire. During the second phase, the relative importance of these criteria was then determined. To achieve this, 25 senior IS executives and management systems (MS) managers were interviewed. This resulted in the addition of extra selection criteria to the original list of factors. A five point Likert scale was used in the questionnaire (with 1 equal to “very low” and 5 equal to “very high”). The researchers proceeded to identify 243 firms from ERP vendors’ lists as their initial target population. The questionnaires were sent out via e-mail and mail and 55 firms sent back usable responses (a response rate of 22.6%).

In phase one 15 factors were identified from the literature (Baki & Cakar, 2005). These included: functionality; technical criteria; cost; service and support from suppliers; vendor’s vision; system reliability³²; compatibility with other systems; ease of customisation; vendor’s market position; better fit with organisational structure; domain knowledge of suppliers; references of the vendor³³; fit with apparent/allied organisation systems; full

²⁶Quality of information and information sources cross-checked and verified.

²⁷In the form of a person with strong leadership skills and a sense of objectivity.

²⁸Diverse individuals need to contribute their unique skills.

²⁹Open communication relationship between vendors and user communities.

³⁰Making users feel part of the acquisition process.

³¹Greater acceptance of new technology and a shorter learning curve.

³²Incorporation of best practices and latest industry trends.

³³Especially with regards to projects completed in the same industry.

cross-module integration, and the duration of implementation time. In phase two, two more factors were added, namely implementation methodology used by the vendor, and consultants³⁴.

Interesting findings are gleaned from the authors' research results which are also relevant to this study. "Fit with parent/allied organisation" was ranked first, while "integration across modules" and "compatibility with other systems" came in second and third respectively. Interesting to note is that "better fit with organisational structure", "service and support" and "cost" came in 14th, 15th and 16th respectively. This is contrary to the findings of previous studies. Most importantly, Baki & Cakar (2005) conclude from these findings that different criteria are important to different organisations. According to the authors, an ERP system may be generic, but every organisation is unique and they should choose the most suitable solution to meet their unique needs.

2.5.5 Ehie and Madsen's critical issues in ERP system implementation

In their study, Ehie & Madsen (2005) identify eight explicit factors accounting for 86% of the variances impacting on ERP system implementation. The authors refer to the high rate of ERP system project failures cited in previous studies and attributed this to organisations' software-centred implementation focus. Instead, they propose a thorough strategic consideration of the multiple criteria which affect implementation to ensure a more successful ERP system project completion.

Data were collected through a review of the literature and interviews with ERP system consultants. The authors developed a questionnaire which identified issues critical to successful ERP system implementation. The questionnaire was subjected to pre-tests by ERP practitioners to ensure validity and consistency. The survey consisted of 38 impacting factors to be rated between 1 and 7 (with one the lowest and seven the highest). The survey was mailed to 200 companies in the Midwestern United States which had either implemented an ERP system or were in the process of implementation. Of these, 36 usable questionnaires were returned resulting in a 18% return rate. Non-compliance was tested for using two approaches. A *t*-test comparison of the annual turnover, number of employees and total assets between the respondents and the non-respondents was conducted. Based on this, differences in responses to the items between the 36 companies and two ERP consultants were examined. Both results indicated that the low response rate showed no evidence of non-response bias.

Data analysis was performed using factor analyses to analyse the companies' responses. Through this process (using SPSS statistical package), the initial 38 items listed to im-

³⁴Preferably with experience in the same industry as that of the organisation, comprehensive knowledge and ability to determine best module fit for the organisation.

pact ERP implementation were reduced to eight. Prior to factor analysis, variables with low correlations to other variables (less than 0.40) and inter-item correlations were discarded. The internal consistency method was used to assess the reliability of the identified factors. Item scores were correlated against factor-scores to ensure that each item had been assigned to the right critical factor. All of the identified critical factors showed high correlations with ERP system implementation, except for human resource development and IT infrastructure.

The authors' findings indicate that top management support has the highest correlation with ERP implementation. This is followed by consulting services, project management principles and process re-engineering in that particular order. Other critical factors identified in the study include: "feasibility/evaluation"; "cost/budget"; "human resource development", and "IT infrastructure". The findings verify what has been indicated by previous studies: ERP system has the potential to transform the organisation and should be viewed from this perspective; top management plays a significant role in the success of ERP system implementation by setting the strategic direction, and a proper understanding of project management principles and its application is important for ERP system projects.

2.5.6 Nah et al.'s factors for successful ERP implementation

As a means to address the problems associated with ERP implementation, Nah, Lau, & Kuang (2001) list eleven factors from literature which they regard as critical for successful implementation. These factors are then grouped according to the ERP system life cycle phases of Markus & Tanis (2002, p. 188-195) discussed in section 2.2. The researchers' methodology consisted mainly of a comprehensive review of existing literature. Databases of published works and IS conference proceedings were searched according to two criteria: Articles had to contain the keywords "success/succeed" or "critical issues" as well as the term "ERP" or any equivalent (such as "MRP II").

Ten articles were found from which eleven factors were distracted by the authors through analysis and grouping of related sub-factors. The factors relevant to ERP system selection consisted of the following: ERP system project teamwork and composition³⁵; top management support³⁶; clarity of business plan and vision³⁷; effectiveness of communica-

³⁵Cross-functional team consisting of both internal staff and consultants.

³⁶Identify ERP project as a top priority, align with strategic business goals and communicate a shared organisational vision and role of the ERP to employees.

³⁷Proposed strategic and tangible benefits, resources, costs, risks and a timeline are amongst the things to be outlined.

tion of expectations³⁸; soundness of project management principles³⁹; project champion⁴⁰, and appropriateness of business and IT legacy systems⁴¹.

From the findings of the authors it is clear that these factors have their grounding in the first phase of the ERP system life cycle and continue for the duration of the life cycle phases. By considering them as part of a preceding selection process, a sound foundation is laid for the duration of the ERP system's life cycle. Nah et al. (2001) conclude that these eleven factors will provide the management of an organisation with a better understanding of the issues related to ERP system implementation. In doing so, the eleven factors may assist them to make better judgements and allocate the right resources to ensure successful ERP system selection and implementation.

2.5.7 Factors affecting software package selection defined by Montazemi et al.

According to Montazemi, Cameron, & Gupta (1996), software package selection can be enhanced by end-user participation. With this in mind, the authors conducted a study to determine to what extent information centres (ICs) could evaluate ease of use and usefulness of software packages for end users. The aim of this study is to reveal insights which could improve end-user computing (EUC) policy and assist IS professionals in developing a more effective partnership with end-users in their organisations.

The MIS department in a large Canadian steel company provided the environment for the testing of the authors' hypothesis. Participants were selected from both the MIS department and the rest of the organisation. From the MIS department, 24 information centre product specialists (ICPSs) were randomly selected out of a total of 43. Added to this were four end-users selected from each of the six organisational departments. In the end, 22 participants from both groups participated in the study, resulting in 125 assessments gathered.

Thirty software packages were selected to be evaluated for their perceived ease of use and usefulness. These consisted of 30% programming packages, 26.6% project management software, 23.3% graphics and design, 13.3% financial and 6.6% other programmes (word processing, expert shell, etc.). Twenty nine of these were microcomputer applications and only one was a mainframe software package.

The authors used a total of three questionnaires to evaluate the selected software packages. The first questionnaire focused on the demographic data of the participants

³⁸Important in this regard is the role of the users in obtaining requirements, approval, comments and reactions.

³⁹Includes establishment of project scope, milestones, critical paths and timelines, amongst others.

⁴⁰Indicates the importance of leadership for the project, as leaders have the authority to set goals, legitimise and manage change and resolve conflict.

⁴¹Provides a technically sound basis to build from.

(gender, educational background, computer experience). The second focused on the computer anxiety of the subjects, while the last questionnaire was used to evaluate perceived ease of use and usefulness, including an item to assess perceived expertise. Assessment of the items in this questionnaire (including the one to assess perceived experience in each software package) was based on a Likert-type scale consisting of seven points (with 3 being “extremely likely” and -3 “extremely unlikely”). Reliability of the questionnaires was tested using Cronbach’s alpha test, while validity was assessed based on the extent to which each item correlated with the overall score. Data analysis was performed using analysis of covariance (ANCOVA), the general linear model (GLM), Cochran’s C, Bartlett-Box and homogeneity tests.

The authors’ findings suggest that the ICPSs differ in their perceptions from the end-users in that they perceived the software packages to be more useful. For the purpose of this study, these findings imply that successful implementation, and therefore successful selection of software packages, may arise from including end-users in the selection and implementation process. In this regard, the authors remark that “selection of software packages without user participation could have adverse effects on their usage”.

2.5.8 Palvia and Chervany’s factors that influence successful technological change

Palvia & Chervany (1995) performed an experiment to test the effects of four factors hypothesised to influence the success of decision support system (DSS) implementation. The research methodology employed consisted of what the authors term a less risky “experimentation” approach. This approach was based on two models: a three-stage change process and a model of technological change. The first provided the conceptual framework for the study and consisted of three phases: unfreezing⁴², moving⁴³ and refreezing⁴⁴.

The research subjects for this study comprised students enrolled for an evening MBA program at the University of Minnesota. Participation was completely voluntary. A significant number (60%) of the research subjects held upper, middle or first-line management positions and only 19% described themselves as being “uncomfortable” with computers. A pre-experimental session was held with the subjects to clearly explain the “three stages of the change process and also the four experimental factors”. The building of a “company-wide financial planning, budgeting and expense tracking system”, called Budget-Aid, was chosen as the DSS setting for the experiment. Each participant received a series of scenarios for each stage of the process and was asked: “What do you think is the percentage

⁴²Affected parties see the limitations and problems of the current system, as well as the benefits and opportunities of the proposed system.

⁴³Systems, procedures and policies are developed to make the new system operational.

⁴⁴Activities of re-enforcing use of the new system on individual, group and organisational level.

change of success of unfreezing/moving/refreezing for the proposed Budget-Aid project?" The scale was delimited at 100%. The experimental design was based on the Balanced Incomplete Block Repeated Measures Design⁴⁵. The participants were allowed to compare scenarios during evaluations and complete it outside of the classroom. The responses were then mailed back to the researchers, resulting in a response rate of 50%.

The authors' findings reveal certain implications which are also relevant to this study. Firstly, the importance of a proper change process for technological change is emphasised. This implies that care should be taken to ensure success is achieved during the early stages of the change process and sufficient time should be allowed for each subsequent stage. Secondly, the success of each stage is also dependent on the level of project champion support. In other words, top-level management support and buy-in are considered essential to successful technological change.

2.6 Studies focusing on ERP system selection in SMEs

2.6.1 Ziaee et al.'s modular approach to ERP system selection in SMEs

Based on their assessment of ERP system selection methods, Ziaee, Fathian, & Sadjadi (2006) conclude that most of these methods suffer from one or more of the following limitations: No resource feasibility is ensured; sufficiently detailed criteria are not used; the methods are not easily quantifiable; only considerations of internal managers are used; the methods do not seem to be compatible with the overall goals and strategies of an organisation, and the methods do require customisation. The authors therefore propose a two-phase selection algorithm involving customer organisation members and potential ERP system products and vendors as part of their research methodology.

The authors' proposed procedure is made up of a preliminary and a selection phase. During phase one, two sub stages are performed. A project team is formed and tasked with modelling business processes and re-engineering them as much as possible. In the second sub stage information on ERP system factors and vendors are gathered from a variety of sources. Using this information, the best vendor is then selected in phase two. An important part of this step is to further determine which modules are to be purchased, ordered and produced. Organisational processes, organisational changes resulting from module implementation, data conversion, user interfaces required, upgrading and project team costs are the factors considered at this stage. Using these six factors, the modules are scored by experts on a scale from 1-9.

⁴⁵As defined by Cochran & Cox (1957).

Normalised weights of each of the six indices acquired in the preliminary phase are obtained using the Eigenvector method. Next, the weighted means of the scores are determined. Integration of these modules is considered by means of two factors: the severity of the relationship between two modules and the effect of the module procurement method. In the first instance, a numerical scale of 1-9 is used (with 1 equal to “not important” and 9 indicating the severity to be “very important”). A quantity is then obtained from ERP project team experts for each case. After assigning a weight to each expert, the weighted mean is calculated. Finally, module procurement is determined using a zero to one programming model.

The proposed method was then applied to a selected SME which controls and manages construction projects for a large automotive company. This illustrated the suitability of the proposed procedure for selection of an ERP system by an SME. Of importance for this study are the factors identified by the authors to assist in selecting an ERP system. These include: ERP system fit with the strategy of the organisation; required infrastructure; network architecture and security; module completeness; standardisation of data; language and currency user-friendliness; ease of integration with external systems; ease of in-house development and upgrading; use of newest capabilities of information technology (IT); automatic backup of information; shorter processing times; minimal errors and maintainability, amongst others. Furthermore, the following factors associated with the selection of a vendor are also considered relevant for the purpose of this study: supporting and consulting services; experience and knowledge of the organisation’s area of business; implementation ability; financial conditions; ERP market share and scale of vendor; research and development; price of products, and services.

2.6.2 Ganapathy and Raju’s framework for ERP system selection in SMEs

As previously referred to, ERP system selection is a complex task for many organisations. Smaller organisations find it particularly difficult due to the smaller number of employees and their low awareness of ERP system in general. Ganapathy & Raju (2008) propose a framework aimed specifically at these organisations to enable them to make informed decisions which will lead the way to a successful ERP implementation. Their research methodology consisted of a multiple case study design of six organisations that made the decision and completed ERP selection.

Companies were selected from SMEs in southern India based on three criteria. These included: annual turnover, a new acquisition and the selection of packaged as opposed to custom-built ERP system. The companies selected were active in different sectors of the economy: automotive, retail (incense), manufacturing (electronics, forgings, stationary) and construction (residential and commercial). In each of these six cases, interviews

were conducted with key stakeholders in the ERP system acquisition process, namely CEOs, managing directors, IT personnel, general managers and consultants. During the interviews, open-ended questions were used to allow for deeper understanding and flexibility of the exploratory study. Transcriptions of the interviews were sent back to the SMEs for verification and further clarification was done via e-mail. The process lasted approximately six months.

The data obtained were analysed and in conjunction with important findings from existing literature a framework was synthesised. This framework consists of three phases: a planning phase, a preparation phase and an execution phase. Phase one consists of four sub stages: Forming an ERP system acquisition team (EAT) and employing people with prior ERP system experience to form part of this team; conducting EAT studies and collecting documents of current business processes; identifying core strengths and weaknesses of the business, and using organisational goals to determine what is expected of the new system. In the second phase ERP systems and vendors are identified, a request for information (RFI) is sent to these vendors, information is compared and collated, inappropriate ERP system and vendors are eliminated, short-listed vendors are contacted for a demo and discussion, a reference site is visited, the level of user satisfaction and the quality of the implementation partner are checked, cost and time needed for implementation are determined by vendors, and vendors are sent a request for presentation (RFPs). The third and final phase of the framework consists of an execution phase. The following activities are performed as part of this phase: The vendor that offered the best fit to the organisational needs is selected; project time lines, decision-making point, terms of reference, payment schedules, vendor, implementation partner and organisation are decided on; responsibilities and a monitoring team are decided upon; a service-level agreement (SLA) is signed with the vendor; the decision and expected results are communicated to stakeholders, and implementation is started.

Ganapathy & Raju (2008) conclude that their framework emphasises the following: The need for a cross-functional team to determine system requirements; proper communication of decisions and resultant change; continuous user participation during the acquisition process, and the performing of quality checks on vendors and implementation partners. A well-planned acquisition process, together with top management commitment, will help to ensure that the right ERP system is selected for a particular organisation.

In addition to this, general observations of the six case studies made by the authors have important implications for this research. It was found that four out of the six organisations followed no formal strategy for selecting their ERP system. This can mainly be attributed to the fact that for most of these organisations this was just another IS acquisition. It is therefore not surprising that no or very little attention was paid to documentation of the organisational processes and practices. Furthermore, no credibility

checks were performed on the vendor and the implementation partner and payments made to the vendor were independent of deliverables.

2.6.3 Chau's package-selection factors in small businesses

According to Chau (1995), it is generally the owners and managers of small businesses who are tasked with selecting ERP system. The purpose of his study is to determine whether the same set of criteria is used across the business spectrum between these two groups. At the onset of the study, the author identified 21 selection factors from the literature. These factors were then grouped according to six broad themes: software-technical⁴⁶; software non-technical⁴⁷; vendor-technical⁴⁸; vendor non-technical⁴⁹; opinions based on technical sources⁵⁰, and opinions based on non-technical sources⁵¹.

To test this, 500 small manufacturing firms located in Hong Kong were randomly selected from the Member's Directory of the Federation of Hong Kong Industries 1991/92 and sent a structured questionnaire. In the context of this study, only businesses with fewer than 50 employees were designated as being "small business". Organisations were further selected on the basis of having made an ERP system purchase in the twelve months preceding the study. Using a five-point Likert scale (with five equal to "extremely important" and one equal to "not important at all"), participants had to score the 21 factors on a questionnaire. Out of the 122 questionnaires received, 68 were used for subsequent analysis of the data.

Significant differences between the results of owners and employees were found that are also import to this study. Amongst the key differences identified by the author were the following: Owners approached package selection from a more strategic point of view; managers considered the factors related to the non-technical side more important than owners did; managers viewed "price and popularity" to be one of the most important factors, with owners viewing it as the least important; owners considered the factors related to the vendor more seriously than did managers; opinions given by in-house experts were rated more important than those of external consultants and vendors/sales representatives, but managers considered both to be of equal importance, and owners rated opinions from subordinates and outside acquaintances more than managers do. In summation, the author conclude that owners seem to emphasise technical factors related to software package selection higher than managers, while in the case of the latter, the

⁴⁶Availability of an integrated hardware/software package, compatibility with existing hardware/software, ease of use/user-friendliness, availability of source code.

⁴⁷Price and popularity.

⁴⁸Technical support, user training, technical skills and experience of using products developed.

⁴⁹Reputation, business skills, references and past business experience with the vendor.

⁵⁰Potential vendors/sales representatives, in-house "experts", external consultants, computer/IS trade magazines and software product leaflets.

⁵¹Subordinates, end-users and outside personal acquaintances.

opposite is true: “The owner should be aware that if he or she delegates the responsibility of selecting packaged software to managers, they may use a different set of criteria in the evaluation”.

2.6.4 Elements of perception in ERP implementation in SMEs according to Equey and Fragnière

Equey & Fragnière (2008) studied the level of implementation and use of ERP system in Swiss SMEs. The purpose of the study is to collect qualitative data to answer the following research question: “Is the satisfaction regarding the benefits provided by ERP systems evenly spread among Swiss SMEs?”

The methodology employed by the researchers was based on a questionnaire survey. Firstly, a multiple case study approach was adopted to elicit research questions and hypotheses. With the help of a senior consultant from a leading ERP system vendor, these were used to develop the first version of the questionnaire. Over 4000 Swiss SMEs were approached to participate in the study. Addresses for these organisations were obtained from the Swiss Office of Statistics (OFS). The organisations were selected according to two criteria: size and linguistic area. The questionnaire was sent out by mail, but an on-line version was also available. The study took place from November 2005 to April 2006. Follow-ups to the questionnaire were done through telephone interviews. In total, 687 SMEs responded, and of these only 125 were using ERP system. (The response rate was 18.2%).

Stata and SPSS statistical packages were used to perform data analysis. For this purpose, the authors decided to focus on the satisfaction variable. Where size was concerned, an analysis of variance (ANOVA) was conducted to compare the means of three or more independent samples. In addition, a *t*-test was also done for two independent samples with regards to the sector the SMEs operated in. Based on the results obtained through these data analysis methods, the researchers concluded that the general level of satisfaction regarding ERP system in SMEs is relatively high, regardless of size or sector.

For the purpose of this review, SMEs perceptions regarding the qualitative aspects of implementation are emphasised. Firstly, the authors found that larger SMEs are more likely to adopt an ERP system. Secondly, approximately half of the respondents indicated that they had implemented ERP system from “other” vendors than the market leaders. Thirdly, involvement by senior management seems to have only a moderate influence on the duration of implementation. Lastly, and arguably most significantly for this study, is the high level of managerial problems and difficulties⁵² associated with ERP system implementation.

⁵²Complexity of the system, work-overload, lack of training, and resistance to change.

2.6.5 ERP system sourcing strategies defined by Sledgianowski et al.

The purpose of the study conducted by Sledgianowski, Tafti & Kierstead (2008) is to identify the different ERP system sourcing options available to SMEs. A case study was selected in the form of Kanebridge Corporation as the most appropriate research design. The company studied operated in the distribution of industrial fasteners. As the business expanded and their sales increased, the organisation was faced with the question of whether to enhance their existing legacy system (using their development partner Dymax Systems) or to develop a new software system in-house.

Data for the study were collected by means of interviews (face-to-face), conversations and e-mails with relevant stakeholders in Kanebridge. This was augmented by critical document review and analysis of company software applications and documents, as well as observations of employees in action at work. These findings were then used to compare the client-vendor relationship between Kanebridge and their new vendor, SourceCode Inc., with that found in existing literature.

The authors' findings from the case study seem to confirm that social networking events are important to foster potential business relationships. The client and outsourcing vendor in this instance also saw themselves as part of an "alliance". Secondly, Kanebridge and its new vendor are similar in size, and this seems to be an important factor for the client organisation, as stated in the literature. In addition, no formal contract was used in this instance, but literature indicates the need for a detailed and comprehensive contract. The authors suggest that the "mutual trust" developed through networking might act as a substitute.

Next, Kanebridge opted for customised functionality, as they realised that no existing package was going to solve their core competency business problems. Tasks which were considered to be highly structured and which required minimal customisation were outsourced, while tasks which required customisation were handled in house. The importance of clear communication and information exchange between the client and the vendor was reaffirmed from the literature. The last critical factor considered to be of importance was the capability of the vendor in terms of technical skills. Once again, this was reaffirmed from the literature. In addition to these, the study also confirmed the importance of other managerial factors, as indicated by previous studies. The active role top management played in providing leadership for the project and establishing the client-vendor relationship is significant.

Many of the factors explicitly identified by Sledgianowski et al. (2008) are relevant to this study. For example, the organisation studied underwent a similar process as Kanebridge Corporation. The factors identified for successful outsourcing in the above paragraph are thus considered of importance as part of ERP system selection. More

specifically, factors related to client-vendor relationship and the size of the vendor also played an important role in the selection process of the organisation studied.

2.6.6 ERP system adoption in mid-size companies according to Van Everdingen et al.

Coinciding with the views proposed by Equey & Fragnière (2008), Van Everdingen, Van Hillegersberg & Waarts (2000) argue that little is known about the development and drivers for ERP system acquisition in mid-size companies. The aim of their study is to “understand developments in ERP adoption within the European mid-market”.

To address this, a multi-country/multi-industry European-focused survey was conducted in 1998. The survey in general focused on current adoption and planned adoption. Questions concerning ERP system adoption decisions, IT company policies, and investment planning were included. Selection was performed at random from the databases of local industries in conjunction with the research sponsor. As a result a sample size of $n = 200$ for each country and $n = 300$ for each industry was ensured.

The authors’ research methodology included telephone interviews with IT managers and relevant financial managers in each selected organisation. Professional call centres were used to carry out the interviews. In total, 2647 organisations in ten countries, spanning six industries were interviewed. These industries included the discrete and automotive, project, electronics, process, food and beverage, and wholesale industries. The industries were dispersed throughout ten European countries. An average of 45 organisations were interviewed for each country/industry combination.

A number of the findings indicated by Van Everdingen et al. (2000) have implications for this study. These include: Respondents indicated that the most important criterion for selecting an information system is fit with current business processes, and next are flexibility of the software and user-friendliness. This seems to be relatively homogeneous across different industries, but not countries. In contrast to what has been found in previous studies, mid-size companies in this study seem to base their selection of ERP system on product characteristics and not vendor specifics. In this regard, functionality of the software was indicated as being the most important characteristic, followed by quality of the product, implementation speed and costs.

2.6.7 Mid-level ERP system evaluation by Fisher et al.

Fisher, Kiang, Fisher, & Chi (2004) argue that mid-size companies may face greater risks, compared to larger organisations, when it comes to ERP system implementation as a result of their diminished human and technical resources. The authors subsequently propose the

use of data envelopment analysis (DEA)⁵³ as a means of assisting these organisations to compare and analyse the mid-level ERP system offerings available to them on the market. Their method is then applied to ERP features and functions identified by Jones (2002) in his research article.

For the purpose of this study, DEA was used to arrive at a single overall score for each package by connecting services to costs. Outputs of the model were obtained through the following service-related attributes: service and support, training, scalability, implementation flexibility, integration, manufacturing process, core financial, purchasing and sales, human resources process, and international tax support. To measure these attributes, a 5 point Likert scale was used (with 5 equal to “excellent” and 1 equal to “below average”). Cost-related attributes⁵⁴ were used as inputs.

As part of DEA, four decision-making units (DMUs) were defined for this study. These included: ERP without support and training; ERP with both support and training; with support only, and with training only. A DMU is defined as “a production operation using m inputs to produce s outputs.” In terms of this definition, it was at the DMUs’ discretion to produce an output-mix, using a particular input-mix.

Following this, Fisher et al. (2004) implemented the DEA model as a linear programming problem using a computer program in order to evaluate the ERP system packages as defined. The relevant inputs and outputs discussed were then used, whereafter ERP system packages were compared to one another to generate an efficiency score. In this way, the strengths and weaknesses of each package were also identified. Reference sets and results were obtained for software, core financial modules, human resources processes, manufacturing processes, purchasing and sales processes, as well as tax and international processes respectively.

Apart from the implicit factors emphasised through the authors’ approach, the implications of the findings are also relevant to this study. Accordingly, the researchers state that their approach affords managers in medium-sized organisations the option of evaluating the best module for their business by considering both the ERP product *and* the vendor. As indicated in previous studies, this verifies the importance of considering vendor criteria as part of ERP system selection.

⁵³DEA was first developed by Charnes, Cooper & Rhodes (1979) and has its foundations in mathematical theory. In brief, it evaluates each production operation with weights believed to be most favourable for its own aggregate performance. In this way it differs from similar ERP system selection procedures in that it makes use of subjective weights to evaluate production operations within a multiple-output, multiple-input setting.

⁵⁴Cost of packages, support and training fees, average implementation time.

2.6.8 Malie et al.'s ERP selection criteria for medium-sized organisations in South Africa

In what seems to be the only study of its kind, Malie, Duffy, & Van Rensburg (2008) address the issue of ERP system selection criteria for medium-sized organisations in South Africa. The purpose of their study is to determine criteria which can assist medium-sized organisation in selecting the right ERP system for their organisation.

At the onset of their study, the authors defined three propositions likely to aid the selection process: Firstly, "Medium-sized South African companies use important criteria to select an ERP system for implementation"; secondly, "When medium-sized South African companies select an ERP system, the three most important selection criteria will be price, functionality and service and support", and lastly, "Manufacturing companies will rate some selection criteria (such as software adaptability) differently from non-manufacturing companies".

Malie et al. (2008) proceeded to identify 14 explicit selection criteria from ERP software system selection literature. These included: cost (affordability); technical criteria; functionality; service and support provided by ERP vendor; vision of the vendor; system reliability; compatibility with other systems; ease of customisation (flexibility); market position of the vendor; compatibility with organisation structure (organisation fit); specialised industry knowledge; vendor references; fit with parent/allied organisation systems (corporate compliance), and implementation time.

Furthermore, data were gathered by means of a questionnaire. Preceding this, the questionnaire was used in a pilot study among 10 respondents from both manufacturing and non-manufacturing organisations. Attribute measurements were based on itemised Likert rating scales. Nonparametric analysis were used on the scales as the data did not seem to be normally distributed. Reliability of the constructs was determined using Cronbach's Alpha Test. The number of responses on each Likert value for each attribute was multiplied to obtain the level of importance for each statement. After this, the means and standard deviations were calculated and used to determine the most important reason for using the derivatives. Following this, the nonparametric variables were ranked by using a Kendall's W Test. Finally, a Mann Whitney U Test was conducted to test the assessment areas rated differently between manufacturing and non-manufacturing companies.

The implications of the findings obtained by Malie et al. (2008) also have bearing on this study. The fourteen factors were confirmed to be of importance when selecting an ERP system, with reliability being the highest rated amongst medium-sized companies. Coinciding with this, service and support were rated second highest, while affordability received one of the lowest ratings. Arguably most importantly, manufacturing and non-manufacturing firms differed in their rating of eight of the fourteen criteria with the first rating flexibility, infrastructure considerations and organisational fit very highly.

2.7 Synthesis of selection factors identified from the literature

Contributions to ERP system selection literature made by different authors are summarised in table 2.2. The synthesis of selection factors is done using two classification schemes. Firstly, different selection factors identified are grouped according to a unifying theme matching one of 18 broad categories. Secondly, the level of significance of each factor is indicated within each category based on the type of emphasis placed on it by the relevant author(s). In this regard three symbols are used to indicate the specific type of emphasis: Explicitly mentioned as part of the findings of the research (F), references made implicitly by means of the methodology followed (M), and references made implicitly by means of implications of the findings of the research (I). The reason for this classification is to indicate and summarise the factors identified by previous researchers as would be expected, but also to give an in-depth description of the level of importance of all the selection factors (either explicitly or implicitly) influencing ERP system selection. The rationale behind the classification of the 18 broad categories is discussed and explained in Appendix D. It is further important to note that where a certain factor such as consulting fees or support and training fees has bearing on more than one category (i.e cost and the need for services of external experts or vendors), that factor is listed in all the appropriate columns.

2.8 Chapter summary

The purpose of this chapter is to review the literature for existing ERP system selection factors, specifically focusing on SMEs. Section 2.2 explained the lack of agreement in the literature on where “selection” ends and “implementation” begins. For the purpose of this literature review, it was decided to focus mainly on literature that specifically treats selection as a separate and preceding stage to implementation. However, due to a lack of research in this field, selection factors from other studies focusing on ERP implementation and software acquisition/evaluation in general were also reviewed. The strategy used to conduct the literature review was set out in tabular format in section 2.3. For this review, a distinction was made between studies specifically focusing on explicit ERP system selection criteria and those that have a different aim, but their findings are still considered important on account of the implicit selection factors identified. Subsequently, section 2.4 summarised the (mostly) implicit selection factors identified in these studies. In section 2.5 the scope of the literature review was narrowed to studies specifically focusing on ERP system selection and associated processes. Moreover, in section 2.6 the scope was further focused on ERP system selection studies conducted in the context of SMEs.

In both these sections, the (mostly) explicit selection factors were identified. Lastly, section 2.7 summarised the explicit and implicit selection factors in 18 broad categories and synthesised these in a comprehensive table indicating their level of emphasis for ERP system selection. In the next chapter, the research design and methodologies used are discussed.

Chapter 3

Case Study: An SME in the Western Cape Wine Industry

3.1 Introduction

As indicated in previous chapters, SMEs differ from larger organisations in important ways which affect their selection of ERP systems. It was also argued that SMEs have unique characteristics and information-seeking practices and differ in their computing needs from industry to industry. On account of these size-specific and industry-specific constraints, it is argued that SMEs operating in the wine industry of the Western Cape find it difficult to select the right ERP system. The purpose of this study is then to define and describe the size-specific and industry-specific factors which influence ERP system selection in an SME in the wine industry. Against this background, the following primary and secondary research questions were proposed in section 1.4 in chapter 1:

1. *What are the size-specific and industry-specific factors an SME in the wine industry of the Western Cape considers to be important when selecting an ERP system?*
2. *Why is it important for an SME to focus on ERP system selection as opposed to implementation only?*
3. *What are the ERP system selection factors in existing literature?*
4. *What are the size-specific factors that influence ERP system selection?*
5. *What are the wine industry-specific factors that influence ERP system selection?*
6. *To what extent do the identified factors help to ensure a better fit between SME requirements and ERP system offerings?*

The purpose of this chapter is to make explicit the research design employed to collect data, analyse it and provide answers to the above mentioned research questions. The

chapter outline is as follows: Section 3.2 introduces the reader to the setting in which the study took place. Under this heading, the wine industry, the South African SME sector, the selected organisation and the ERP system selection process are discussed in detail. Section 3.3 describes the participants selected for the purpose of the study. The methods used to collect data and the protocols followed are discussed in sections 3.4 and 3.5 respectively. Of particular importance are the mechanisms employed to ensure validity and reliability of the study which are discussed in part of section 3.5. This chapter concludes with section 3.6 by giving a description of the data analysis techniques followed.

3.2 Setting

This section describes the research sites where the research was conducted. It commences with a broad description of the research setting, before narrowing the focus to individual areas where data were collected. Hence, the global wine industry and South African wine sector are first discussed in subsection 3.2.1. Following this, an overview of the software products used by wineries in South Africa is given in subsection 3.2.2, with a particular emphasis on the available ERP system products. The focus is further narrowed in subsection 3.2.3 by introducing the reader to the characteristics of SMEs and how these may affect their selection of ERP systems. This section concludes with subsection 3.2.4 by giving detailed descriptions of the organisation selected for the purpose of the study, and of the ERP system selection process followed.

3.2.1 The wine industry

3.2.1.1 History and general overview

The global wine industry is traditionally regarded by those in the industry to be divided into “old world” and “new world” wine producing countries (Aylward & Turpin, 2003, p. 508). The first category comprises mainly European producers such as France, Spain and Germany where wine has been successfully produced since the fourth century A.D. (Aylward & Turpin, 2003, p. 508; Anderson, Norman & Wittwer, 2003, p. 660). The latter category refers to countries where wine making has its origins in the arrival of the first European colonisers dating back to the 1500s (Anderson et al., 2003, p. 660). Apart from the United States, this predominantly includes countries from the Southern Hemisphere such as Australia, New Zealand, and Chile (Anderson et al., 2003, p. 660-661).

According to Aylward & Turpin (2003, p. 508), old world producers have dominated the world wine market for centuries. However, since the 1980s the market shares of new world producers have increased as a result of increases in their production and exports (Aylward & Turpin, 2003, p. 508; Anderson et al., 2003, p. 661). This trend is expected

to continue into the foreseeable future (Aylward & Turpin, 2003, p. 508). Apart from this, the industry has had to face structural changes: changes in consumer purchase patterns (from specialist wine outlets to supermarkets) and the shift in consumer demand (from basic low quality wines to premium wines) have contributed to increased competitiveness in the market on an international scale (Wood & Kaplan 2005, p. 382; Anderson et al. 2003, p. 662). And more recently, statistical data provided by the International Organisation of Vine and Wine or *Organisation Internationale de la Vigne et du Vin* (OIV) indicate that despite an increase of 1.1 million hectolitres of wine produced in 2009, a decrease of 8.765 million hectolitres in world-wide consumption and 3.47 million hectolitres in exports were recorded respectively (Organisation Internationale de la Vigne et du Vin, 2010, p. 4-7).

3.2.1.2 The South African wine industry

The South African wine industry is classified as part of the new world category described in subsection 3.2.1.1. As was the case with the international wine market, the South African wine industry also underwent significant structural changes in the last number of decades. According to Ponte & Ewert (2009, p. 1638), the end of apartheid signified the opening up of the South African market to international demands and competition: “With the opening of export trade in the 1990’s, the industry was faced with a hitherto unknown set of demands and product qualities, styles, processes, and logistics that differed dramatically from what it had been accustomed to”. This change brought with it the end of the quota system which had regulated wine production in the country for over thirty years (Wood & Kaplan, 2005, p. 383). The quota system limited domestic wine surplus by means of a prescription mechanism, where each producer was allowed to have only a limited prescribed area for vineyards and prices were kept high by linking them to volume and not to variety or quality (Wood & Kaplan, 2005, p. 383). As part of the system, smaller local cooperatives were also allowed to force their members to sell their grapes through them, thereby adding an additional layer of regulation (Wood & Kaplan, 2005, p. 383). The quota system was administered by the *Koöperatiewe Wijnbouers Vereniging van Zuid-Afrika Bpkt.* (KWV) and most producers were required to become members. With the end of the quota system in the early 1990s, the industry saw a marked increase in the planting of new vineyards, especially towards varieties demanded by the global market (Wood & Kaplan, 2005, p. 383).

Today, the wine industry in South Africa is a vast and profitable industry. According to recent statistical data from the OIV (2010, p. 4), South Africa is regarded to be the world’s 9th biggest wine-producing country (with production reaching 9 788 thousand hectolitres in 2009) and the 6th biggest wine exporter (with 3 958 thousand hectolitres exported for the same time period). In 2008 the total turnover of the wine industry was

R19 164 million, an increase of 79% for the five-year period between 2003 and 2008 (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 7). In 2009, a total of 3 667 primary grape producers and 604 wine cellars that crush grapes were registered in the country (South African Wine Industry Information & Systems, 2010, p. 6). These entities were responsible for a total of 1 327 620 tons of grapes crushed and 1 033.4 million litres of wine produced (South African Wine Industry Information & Systems, 2010, p. 4). For the same time period, domestic sales amounted to 356.8 million litres, while exports totalled 395.6 million litres (South African Wine Industry Information & Systems, 2010, p. 4). Of the total 101 259 hectares under vines in South Africa in 2009, 92.12% were located within the borders of the Western Cape province (South African Wine Industry Information & Systems, 2010, p. 8).

With regards to the economic impact of the industry, annual GDP contribution totalled R26 223 million in 2008 (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 8). Moreover, GDP per unit of capital invested averaged 0.07% higher than the national average of 0.46% (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 8). This figure also takes into account the “backwards linkages”¹ of the wine industry (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 33-34). In 2008 the industry supported a total of 275 606 employment opportunities of which 58% were classified as unskilled labour (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 8). The labour to capital ratio² was set at 5.54%, 2.36% higher than the national average (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 8-9). Equally important is the fact that low-income households received 18% of the disposable income of R17 124 million generated by the wine industry (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 9). This was, one again, higher than the national average of 16% (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 9).

3.2.1.3 Impact of the wine industry in the Western Cape

The economic impact of the wine industry is most profound in the Western Cape. Approximately 54% of the total GDP generated by the wine industry remained in the province in 2008 (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 8). The industry also contributed R14 214 million (or 7, 3%) to the province’s total GDP for 2008 (South African Wine Industry Information & Systems &

¹Direct (32%), indirect (30%) and induced (38%) impacts of the wine industry “through its linkages with other sectors in the economy in terms of buying of materials, the paying of salaries and wages and the resultant expenditure on consumer goods”(South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 33-34).

²Indicates the effectiveness with which capital is applied in the economy (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 9).

Conningarth Economists, 2009, p. 29). In terms of employment opportunities, the industry is responsible for 8.8% of total employment in the province (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 30). It is further estimated that a large part of the disposable income produced by the wine industry is spent in local areas in the province (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 9). This, regarded with the annual production expenditure by wine farmers, indicates that the wine industry functions as the economic lifeline for many (rural) districts in the province (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 9). No conclusive research has to date been done on the economic effects of wine tourism on the region, but it is estimated that this sector of the industry makes a sizeable contribution to the province's income (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 8).

3.2.1.4 Challenges faced by the industry

Notwithstanding the advances made since 1994, the South African wine industry today is not without its share of challenges. The past decade saw a dramatic increase in red wine production, both locally and abroad (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 7). Decreased demand and unfavourable prices in the domestic market necessitated more producers to export their produce surplus (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 7). Consequently, South African producers found themselves contending on an international level against other competitive new world markets (facing similar situations), making the local industry more vulnerable to volatile exchange rates (South African Wine Industry Information & Systems & Conningarth Economists, 2009, p. 14). The strength of the Rand compared to other currencies in recent years intensified this problem: Wine farms were no longer making a profit from exports and by 2010 the industry was facing its sixth year in an economic down cycle (Thomas, 2010, p. 31-32). As a result, producers had to cut back on their capital expenditure in an effort to compensate for the fall in revenue (Thomas, 2010, p. 34).

In addition to an increased reliance on exports, the local wine industry faces a host of other challenges. These include: backlogs with certification, inconsistencies in the wine supply channel, and the upgrading of effective traceability systems to comply with European Union (EU) standards, amongst others (University of Pretoria Department of Agricultural Economics, Extension and Rural Development & Agri-Africa Consultants, 2008, p. 38). The higher cost of packaging materials, the lack of fast and efficient new packaging and bottling designs, port and harbour inefficiencies, the lack of information-sharing with similar industries, limited shipping options and ineffective rail costs and

poor rail services were also identified as significant constraints for the industry (University of Pretoria Department of Agricultural Economics, Extension and Rural Development & Agri-Africa Consultants, 2008, p. 38-39). A survey conducted by PriceWaterhouse-Coopers (2010, p. 5-6) further found that the wine industry is marked by ineffective supply chain management³ and a lack of human resource capacity⁴. At the same time, the wine industry also has to deal with the implications of fluctuations in weather conditions, which have an effect on the crop yield and make it more difficult for producers to forecast accurately (Wines of South Africa, 2010).

3.2.2 WIS context

This subsection gives the reader an overview of the available software products wine producers can use to assist them in dealing with the challenges mentioned. Such an overview is considered to be especially relevant for the purpose of this study: The products of the main ERP system vendors on the world market currently do not provide for full wine production and related vineyard functionalities. The local software market therefore mainly consists of smaller vendors who attempt to offer a comprehensive solution⁵, or more often, only offer wine production software⁶. In this section, the researcher intends to create a better understanding on the part of the reader of the greater context in which the organisation studied had to conduct its ERP system selection procedure. Its aim therefore is not to function as a critical review of available products, but to give an overview of the different products and the functionalities they provide.

3.2.2.1 EzyWine

The first product to be discussed is called EzyWine. This product claims to offer its users a comprehensive ERP system solution by means of the following modules: Accounts Payable; Accounts Receivable; Asset Register; General Ledger; Marketing; Payroll and Human Resources; Plant Servicing; Wine-making; Bottling; Purchase Orders; Sales; Point-of Sale (POS) and Wine Club; Stock Control; Vineyard Management and System Administration (Ezy Systems Pty. Ltd., 2010). The most significant characteristics of EzyWine can be summarised as follows: full end-to-end integration; professional ongoing support; compliance with various statutory requirements in the industry; restricted user access when desired, and capturing of best practises from its users (Ezy Systems Pty. Ltd., 2010). In addition, the product claims to remove reliance on different packages

³Limiting the competitiveness.

⁴Where communication between employees and employers, and training and skills development need improvement.

⁵Comprising of both wine making and ERP functionalities.

⁶Which functions as an add-on to an existing ERP system of one of the major ERP vendors on the market.

and the need for highly skilled IT personnel to reduce the dependency on spreadsheets, to provide for stock control, true costs and flexible, timely information and to remove departmental bottlenecks (Ezy Systems Pty. Ltd., 2010).

3.2.2.2 Veryko Wine Solution

In comparison, Veryko Solutions has developed a wine and spirit software solution which uses an ERP system from SAP as its platform (Veryko Solutions, 2010). Their solution is said to cover the entire wine-making process by offering the following functionalities: vineyard block record system; grape intake; grape crushing; fermentation; maturation of wine; wine blending; bulk planning; quality inspections; transfer of products between tanks; tank overview; topping of tanks, and wine composition analysis (Veryko Solutions, 2010). Veryko Wine Solution differs from EzyWine in that it leaves bottling and distribution functionalities over to the SAP R/3 system to perform (Veryko Solutions, 2010). Important characteristics of this software product are the following: authorisation options; grape block and wine batch traceability; integrated costing (of wine-making and other financial); scalability, and rapid implementation (Veryko Solutions, 2010).

3.2.2.3 Wine MS Cellar and Vineyard

Similar to Veryko Wine Solution, Wine MS Cellar does not claim to offer full ERP system functionality, but is instead marketed as a “cellar management solution” and “decision-making tool” for wineries of various sizes (WineMS, n.d.). The following modules are offered as part of the product: Standard; Intake Management; Bulk Wine Management; Cellar Payments; Bottling Management; Pastel Integration, and Satellite or Offline Management (WineMS, n.d.). The most important characteristics of this product are the following: wine process tracking from the vineyard to bottling runs; management and planning of the annual harvest; management and analysis of yearly grape intakes from suppliers; calculation of grape yields; controlling and tracking of bulk wine stock with historical integrity; allocation of additive stock or dry stock for wine batches; management of barrel inventory and wine in barrel groups; calculation of actual wine costs; compliance with food safety regulations; management of wine contract allocation; tracking and management of wine services; plotting and reviewing wine analysis; management of planning, execution, allocation and dispatching of bottling runs; management of the wine pool and calculation of producer payments, and integration with Google Earth and Softline Pastel accounting software (WineMS, n.d.).

In addition to Wine MS Cellar, the company offers a product, called Wine MS Vineyard, aimed at farming businesses (WineMS, n.d.). As is the case with Wine MS Cellar, this product is also implemented on a modular basis comprising six modules: Standard; Vineyard Activities; Spray and Fertilisation; Vineyard Measurement; Long-term Plan-

ning, and GIS/Google Earth reporting (WineMS, n.d.). These modules collectively offer the following essential functionalities: management of block records per vineyard and block yields per vintage; analysis of block yields per vintage; management and application of quality control to operations; controlling chemical and fertiliser stock and applying of spray programmes to blocks; tracking and managing application of water; capturing and comparing of annual measurements; planning by means of harvest estimates and production planning; calculation of net income through comparing block income with industry production plan statistics, and integration with Google Earth (WineMS, n.d.).

3.2.2.4 Cellar Management Africa

Cellar Management Africa is a product developed by Donkerhoekdata with the aim to “consolidate and analyse information necessary to manage a wine estate or co-operative” (Donkerhoekdata, 2006). This product comprises the following three independent modules: grape intake⁷, wine production⁸ and wine sales⁹. By means of these three modules, Cellar Management Africa claims to offer vital functionalities such as vineyard block records, classification of grapes, certification, comprehensive reports (for traceability), and easy integration with personal data assistants (PDAs) and bar code scanners, amongst others (Donkerhoekdata, 2006). In addition to this product, Donkerhoekdata also developed software for payroll and farm management purposes which can be used by wine producers (Donkerhoekdata, 2006).

3.2.2.5 MB4000 Farm Management

MB4000 Farm Management package is a farm management software product and record keeping system developed by DFM software (DFM Software, 2010). This product has the following main features: application records of agro-chemicals; tractor calibration; instructions and various point systems; agro-chemical stock control; block records; a pest and disease monitoring system; climate history; records and models; production records; cost allocation and activity management, and user-friendly custom report writing facilities (DFM Software, 2010). The MB4000 Farm Management package is compliant with various industry standards such as Global G.A.P (Good Agricultural Practices) and Nature’s Choice (DFM Software, 2010). DFM Software also provides wine producers with a choice of software for irrigation control, probe utilities, payroll and time-keeping functionalities (DFM Software, 2010).

⁷Automates the data-capturing processes associated with grape intake from the vineyards.

⁸Traces wine movement in the cellar.

⁹Includes stock control, debtors, pricing, and point of sale functionalities, amongst others.

3.2.2.6 Wineware

Wineware claims to offer wine producers an array of different software packages to address their diverse needs (Wineware Consulting, 2010). The first product, Wine Till, allows for the management of stocks and invoices, also accommodating bottling runs and Bill of Materials (BOM) (Wineware Consulting, 2010). Secondly, Wine Tracking System allows users to track vineyard block information, for example cultivars, sizes, clones, rootstock, trellising, vine spacing and age (Wineware Consulting, 2010). Thirdly, Christalball provides for a consolidation between supply and demand, allowing for adjustment of future sales targets and the necessary changes which accompany this (Wineware Consulting, 2010). Finally, Wineware also offers software that can be used to determine which vintages sell the best (called Quality Link) and to locate wine in a private cellar (called Cellar Guide) (Wineware Consulting, 2010). These products are also compatible with most packaged software solutions, in particular Softline Pastel accounting software (Wineware Consulting, 2010).

3.2.3 SME context

A discussion of the setting in which the research took place would not be complete without a discussion of the size context in which the organisation studied operates. It is therefore the purpose of this section to focus the attention of the reader on the size-related characteristics of SMEs and how these might influence the selection of ERP systems and other software. Section 3.2.3.1 partly serves this purpose by giving a brief description of the SME sector in South Africa and introducing the reader to general size-related characteristics of SMEs which distinguish them from larger organisations. This argument is then augmented in section 3.2.3.2 where it is shown that these characteristics are an important consideration during ERP system selection.

3.2.3.1 The SME sector in South Africa and SME characteristics

As the researcher could find no agreed-upon definition of what constitutes an SME within the wine industry, the general classifications set out in the National Small Business Act of 1996 and adopted by the Department of Trade and Industry (DTI) were followed. According to the Act (Republic of South Africa, 1996, p. 2), a small business is defined as “a separate and distinct business entity, including cooperative enterprises and non-governmental organisations, managed by one owner or more”. Within the specifications set out for the agricultural industry in the Act, an SME is defined as employing between 50 and 100 people, has a total annual turnover of less than R4 million and a gross asset value (excluding fixed property) totalling not more than R4 million (Republic of South Africa, 1996, p. 15).

The Agricultural SME sector accounts for 204 429 of SMEs in the country (Berry et al., 2002, p. 15). The majority of these smaller organisations are concentrated mainly in metropolitan locations in urbanised provinces such as Gauteng, Kwazulu-Natal and the Western Cape (Berry et al., 2002, p. 23). This sector seems to be marked by low registration rates of new corporate companies and low attrition when compared to the financial and business services and the trade/hotels and restaurants sectors (Berry et al., 2002, p. 18-19).

In a recent study conducted by Olawale & Garwe (2010, p. 730-732), the authors shortlisted various variables that may have an adverse impact on the growth and sustainability of SMEs in South Africa. First on their list were factors regarding the internal business environment of these organisations: access to finance; a lack of necessary managerial skills amongst employees; geographical location (especially concerning buyers and suppliers) and networking; investment in technology, as well as the ability to remain up to date with technological developments and the cost of production (Olawale & Garwe, 2010, 731). In addition to this, the authors noted variables in the external business environment that may also impact an organisation's performance: economic variables¹⁰ and the world market; crime and corruption; unfavourable labour regulations, and lacking infrastructure and regulations¹¹.

Newberry (2006, p. 2-3) corroborated these findings in a similar study conducted on the role of SMEs in the futures of emerging economies. Based on his findings, Newberry (2006, p. 2-3) inferred the following challenges: A harsh regulatory environment where most of the regulations have been developed for enforcement in large organisations with a higher revenue income, inadequate funding¹², and managerial skills and experience. This line of thought was further developed in a study conducted by Dutta & Evrard (1999, p. 239-241) on the strategic management of IT in European SMEs. The authors conclude that the following factors were characteristic of the SMEs studied: low survival rates; a small number of employees; a number of differences between countries and different sectors, and a lack of financial resources constrain innovation within these businesses.

Furthermore, Malhotra & Temponi (2010) identified a set of common SME characteristics. Their findings included: having a specialised product for a niche market; the desire to deliver this product to the buyers as soon as possible; a susceptibility to external market forces and geographical location may influence organisational culture and the ability to recruit skilled employees, and employees usually perform a variety of different functions and roles within the business (Malhotra & Temponi, 2010, p. 30). Cragg & Zinatelli (1995) conducted a longitudinal study on eighteen small firms over a period of eight years to determine their IS sophistication and evolution. Their findings revealed

¹⁰Fiscal policy, exchange rates and inflation rate.

¹¹Licence fees and taxes.

¹²SMEs cannot always comply with the strict conditions mandated by banks.

that most SMEs had inadequate hardware and software, failed to routinely upgrade these capabilities, were characterised by a general lack of internal computer expertise, that their IS received inadequate attention by management, training of users was lacking and no responsibility was assigned for IS in the organisation (Cragg & Zinatelli, 1995, p. 5-7). Huin (2004, p. 511-512) further claims that SMEs also differ from larger organisations with regard to factors impacting an organisation's strategy. Moreover, Huin (2004, p. 512-513) points out that SMEs exhibit flatter organisation hierarchies, CEOs tend to be more directly involved, smaller organisations have less distinct inter-departmental boundaries and tend to have higher staff turnover rates.

3.2.3.2 The effect of SME characteristics on their choice of software

Based on the characteristics mentioned in the previous paragraphs, various authors¹³ make a case for the implications these have on the selection of ERP system and other software. Examples include a low cost of the ERP system product, the scarcity of vendors, choosing between bigger and smaller vendors, and an unwillingness or inability on the part of the vendor to adequately customise the ERP system to meet the needs of smaller organisations (Erpwire, 2010). In addition, Darrow & Morejon (2007, p. 29-30) argue that smaller businesses often find it difficult to choose between similar ERP system products on the market. Moreover, there is often an expectation on the part of SMEs that vendors should provide support, particularly with regards to IT strategy, training of users, keeping up to date with IT developments and using and analysing existing data in a more efficient manner (Dutta & Evrard, 1999, p. 247; Darrow & Morejon, 2007, p. 29). Findings of the authors further indicate that vendors should be knowledgeable about the particular industry the SME operates in and that SMEs often do not altogether comprehend how ERP system can benefit their organisations (Darrow & Morejon, 2007, p. 29-30; Dutta & Evrard, 1999, p. 246).

Equally important, Bernroider & Koch (2001, p. 253) found that smaller organisations tend to view flexibility and adaptability of software, short implementation time and fit with business procedures as some of the most significant factors when selecting ERP system. In another instance Liang & Xue (2004, p. 413) analysed the importance of fit between ERP system and SMEs and concluded: "ERP systems need to be localised to reflect specific management features", referring to the different social, economic and regulatory contexts of different countries.

Ein-Dor & Segev (1978, p. 1072) propose that MIS projects are more prone to failure in smaller organisations as a result of time frame problems and the lack of maturity characteristic of SMEs. In addition, Parijat & Pranab (2009, p. 8) argue that SMEs are

¹³Malhotra & Temponi (2010); Gable & Stewart (1999); Mabert, Soni & Venkataramanan (2003); Kagan et al. (1990).

inclined to customise their ERP system, develop their own extensions and buy a best-of-breed package¹⁴. This in turn increases costs on the side of the business as the software needs to be implemented, integrated and upgraded as the business evolves (Parijat & Pranab, 2009, p. 8).

Most importantly, Lang et al. (1997) indicate that smaller organisations further differ from their larger counterparts in ways that also affect their information-seeking practices. The authors summarised the views held by various other authors to state their findings regarding how smaller businesses differ from larger ones: Smaller organisations have a lack of or possess IS considerably less sophisticated in nature; their information-gathering responsibilities seem to fall to one or two individuals as opposed to top executives executing environment scanning activities; they have fewer resources at their disposal to gather information, and they differ from their larger counterparts in terms of the quantity and quality of information they have access to.

Based on what has been discussed, different authors¹⁵ agree that IT, and more specifically, ERP systems are to play an important role in SMEs in future. The characteristics mentioned in this subsection should therefore be seriously considered by any SME as part of its ERP system selection process. This may lead to an increased probability of achieving a better fit between the requirements of the organisations and the offerings of the ERP system: “An ERP system that broadly accommodates small business dynamics should have an increased probability of success” (Malhotra & Temponi, 2010).

3.2.4 Organisation selected for the study

This subsection narrows the focus of the study by giving an in-depth description of the organisation selected for the purpose of this study. The first part, section 3.2.4.1 gives a general overview of the organisation and its various business functions. Following this, section 3.2.4.2 focuses on the state of the software employed in the organisation and describes the associated frustrations experienced. Lastly, section 3.2.4.3 maps the selection procedure followed to select a new ERP system. The information presented in this subsection was obtained by means of private and public corporate reports, project documents, interviews, e-mail correspondence and other sources. To honour the anonymity request of the organisation no direct references to these sources are henceforth made either in-text or in the bibliography of this study. The organisation’s real name has also been replaced with a pseudonym.

¹⁴ERP packages from multiple vendors.

¹⁵Dutta & Evrard (1999, p. 241); Raymond & Uwizeyemungu (2007, p. 499).

3.2.4.1 General overview of the organisation

The Pinotage Wine Company can be described as a producer of both quality wines for different well-known brands, and wines aimed at wine wholesalers and retailers¹⁶. The organisation is a separate business entity forming part of a larger corporation and holdings company, located in the Stellenbosch wine region of the Western Cape. The volume of wine sold by them in 2008 totalled more than 15 million litres, a major portion (approximately 80%) of which was exported to 22 foreign countries, mostly located within the EU. To sustain this high level of production, the organisation not only grows its own grapes, but also procures grapes from various wine farms in and around the Stellenbosch region. This strategy affords the organisation the flexibility to source grapes and grape juice from different regions, depending on the cultivars and grape yields needed.

According to the definition set out in the National Small Business Act (Republic of South Africa, 1996, 2)¹⁷, the Pinotage Wine Company can be classified as a medium-sized enterprise. The organisation employed 84 full-time employees in 2008, placing it firmly within the bracket of 50 to 100 full-time employees, as specified by the Act.

The organisation has been certified under ISO 22000 (International Organisation for Standardisation) regarding requirements for food safety. To obtain this certification, the organisation had to streamline their manufacturing process to comply with Hazard Analysis and Critical Control Point (HACCP) principles. This is seen as essential to guarantee the safety of the wine for export requirements. Furthermore, the organisation has a total of 427 suppliers. Approximately 60% or more of these are from local surrounding areas. It is estimated that around 77% of the total amount spent by the corporation on procurement in 2008 can be traced back to the Pinotage Wine Company.

With regards to financial performance, wine sales increased by 8% in 2008. The Pinotage Wine Company further managed to decrease their manufacturing cost of sales by R10 million compared to the previous fiscal year. Future economic goals include increasing the sales of their branded wines to 865 000 and the volumes of wine cases produced to 1,6 million, and to continue producing award-winning wines.

Lesser, but nonetheless important factors include the Pinotage Wine Company's commitment to the training and development of its staff and its emphasis on the environment. Firstly, the organisation views learning as a continuous process that should take place across all employment levels and leadership positions. Secondly, it has also committed to reduce its stake in the carbon footprint of the entire corporation, which have significant implications for the process of wine production.

¹⁶Commonly referred to as bulk wine.

¹⁷See 3.2.3.1.

3.2.4.2 Organisational structure and state of current systems

The organisational structure of the Pinotage Wine Company Operations Committee comprises six top-level management positions. These include: Financial Director; Marketing Director; Wines Operations Director; Cellar Manager; Sales Director, and Human Resources Manager. Many of the management roles mentioned here also form part of the executive committee for the entire corporation and fall under the auspices of the CEO of the organisation.

Under the Operations Committee, there is a second level of management positions. These include: Financial Manager¹⁸, Wine Procurement and Viticulturist¹⁹, and International Sales Director and Sales Manager²⁰. Given the extent of his involvement in the Pinotage Wine Company, the Information and Communication Technology (ICT) Director for the corporation was also included in the study.

From the organisational structures discussed, it is evident that a large percentage of the corporation's business revolves around wine production. In accordance with this and for the purposes of the study, the following wine-making related business units were defined: Primary Wine-making²¹; Secondary Wine-making²²; Inventory Management; Bottle Production, and Sales, Stock and Production Forecasting.

The organisation engages in various business processes regarding the production of wine. These can be summarised as follows: Grapes are harvested from various vineyards, then weighed, sorted and crushed. The juice produced through this process is stored in tanks in the cellar of Primary Wine-making. Once in the cellar, the juice undergoes various processes²³ to be finally classified as wine. The wine is then transferred to wine barrels for an extended period of time. Depending on the grape cultivars used and the variant of wine the winemakers choose to produce, the exact time may differ. The wine is then again transferred to external bottling plants. The Pinotage Wine Company can also decide to procure grape juice from other wine cellars. This is then transferred and stored in tanks in the cellar of Secondary Wine-making, where it undergoes similar wine-making processes (as mentioned). The wine is then again transferred to an external bottling plant where it is bottled according to product specifications.

In the bottling plant a bottling schedule is set up and a "bottling run" is conducted. This process consists of wine being transferred to the bottles, and the adding of various "dry goods"²⁴ to deliver a finished product. Throughout this process the wine is continu-

¹⁸Under Financial Director.

¹⁹Under Cellar Manager.

²⁰Under Sales Director.

²¹Wine produced by the Pinotage Wine Company.

²²Contracted wines bought from other wine cellars.

²³Filtering, blending, adding of chemicals and other additives and temperature measurement and adjustments.

²⁴This includes labels, corks, etc.

ously tasted for the desired results. The bottles are then packed and marked as finished goods if the process was completed successfully. However, it sometimes happens that the bottling run requires a “rework”²⁵, where it has to be rescheduled and the necessary changes have to be made to the identified products. After bottling, the finished goods are then either stored in a warehouse (before being exported) or locally distributed. In the event of the former, the wines are loaded on to ships and exported to the desired destination. In the case of the latter the wine is distributed to local centres in South Africa by a local distribution company.

To assist with these day-to-day operations the organisation makes use primarily of three different systems. These include: ERP system, Demand Solutions²⁶ and Cognos²⁷. For the purpose of this study, only the ERP system and the manner in which it interfaces with these and other external systems are discussed. The original ERP system was implemented in 1997 in its full capacity (all modules) on a Unix platform. The exact date of the implementation is not known. No other similar system was in use at the time of implementation.

Since the implementation of the ERP system the organisation underwent considerable structural changes. With these changes came the need for more sophisticated functionalities to be performed by the ERP system. Subsequently, modifications were done to the standard ERP system through extract, transform and load (ETL) scripts and the creation of a data warehouse. Cognos software was also later added. The idea behind this was to overcome frustrations and limitations with regards to the tables comprising the system and by doing so further to enhance the original functionalities of the ERP system.

As time passed, the organisations continued to develop functionalities outside of the ERP system. The Pinotage Wine Company sought to solve their problems with the ERP system internally and customisation continued for an extended period of time ranging from 1999 to 2010. Within this period the organisation fell behind with updating the ERP system. As a result of these actions the SLA between the ERP vendor and the Pinotage Wine Company was compromised. Since 2006, nothing has been done to address the systems and organisational problems arising from this.

The Pinotage Wine Company makes use of a number of modules and functionalities of the ERP system. For example, Primary Wine-making and Secondary Wine-making utilise modules which assist them with wine-making, stock control and management, accounts and managing the vineyards. Inventory Management employs modules to assist with inventory control, sales and invoicing. The scheduling and bottling run is also loaded into the ERP system.

At present, the Pinotage Wine Company does not make use of the ERP system for

²⁵This refers to finished goods that do not meet the standards of sale.

²⁶The supply chain MIS.

²⁷Business intelligence and forecasting system.

forecasting and business planning. However, the software employed for these purposes needs to be able to draw data from the ERP system to perform various functions. Apart from this, the ERP system also has to interface and exchange data with different external systems of the warehousing, distribution and bottling external stakeholders.

The organisation makes extensive use of Microsoft Office Excel spreadsheets software for internal planning and forecasting. The various wine-making-related units have developed different kinds of spreadsheets for this purpose. For example, vessel wine cost²⁸, blends tracker²⁹, BOM³⁰, specifications³¹, planning³², and spreadsheets for sales, material requirements planning, resources planning and stock inventory dry goods, finished goods and bulk wine, amongst others.

Furthermore, the company employed an industrial engineering firm to map their business processes and indicate areas for improvement. Some of the challenges identified in this regard can be traced back (either directly or indirectly) to an ineffective information system. These include: Feelings amongst members of staff that there is not adequate time at their disposal to complete their daily tasks; too much time spent handling crises; poor communication between different functional units in the business; faster growth in sales than in profit, an imbalance in employee workload, and specific challenges regarding wine classification and forecasting and finished goods storage.

3.2.4.3 The process of selecting a new ERP system

In an effort to correct the situation described above, the organisation decided in 2010 to instigate a process for the selection of a new ERP system. This process was led by the ICT Director for the corporation, with support from the CEO. The project consisted of five definitive phases: definition of the project and communication to business; requirements analysis workshops; information consolidation; vendor briefing and product analysis, and final assessment and solution selection. The outline for this process was decided upon by the ICT Director with the help of an external consultant, who was specifically sought on the basis of being vendor neutral.

The purpose of phase one was to define the scope and objective of the project, as well as compile a project team and identify the main stakeholders. In brief, the scope of the project included the following: improving business efficiency through the re-evaluation of the Pinotage Wine Company's current business systems; identification of the associated risks and ways of reducing these; reducing inefficiencies by means of improved technology; systems integration and aligning this to the business strategy, and a review of the main

²⁸Tracking of standard wine costing.

²⁹For the value added costs associated with the blending of different kinds of wine.

³⁰Set up for every product before it is produced.

³¹A visual and written description of every product.

³²Of bottling schedule.

IS (ERP system, Demand Solutions, Cognos and financial).

However, software applications used by the Human Resources and Security departments were excluded from the project. Project stakeholders included: the operational business areas affected³³, outsourced operations³⁴, suppliers³⁵, external clients and the different ERP system vendors to be approached.

The project team comprised four levels. These included: a strategy team, project manager, head of project task team and a task team or working committee. Subsequently, the strategy team consisted of the Financial Director, and the Pinotage Wine Company's Financial Manager, Logistics Manager, Winemaker and ICT Director. The ICT Director was also assigned the position of project manager, while the position of head of the project task team was allocated to the Cost and Systems Manager. The task team was formed to consist out of individuals from the business areas affected by the project (mentioned above). Each of these members was asked to allocate one hour per week to duties concerning the project.

The aim of the second phase of the project was threefold. Firstly, problems related to the system within the different affected areas had to be identified. Secondly, the methods and resources used by individuals in these areas to address these problems needed to be ascertained. Thirdly, individuals could propose solutions or new suggestions to overcome the identified problems. Six requirements analysis meetings were scheduled in total with an initial time frame of four weeks. However, this was later adjusted to five meetings over a longer time span due to other problems taking precedence in the organisation.

In phase three the different issues identified in the requirements analysis meetings were assessed and mapped. The aim behind this was to give a broad overview of the different problem areas in light of the company's objectives. The intention was to use this information to compile a RFI to be sent out to different vendors. Subsequently, short-listed vendors were to receive a RFP. This entailed a demonstration of their systems to the project team (phase four) using a scenario that was characteristic of a typical business function within the organisation. In the fifth and final phase, the most suitable vendor were to be selected, based on the demonstrations delivered in phase four.

The researcher was involved with the ERP system selection process up until the third phase. This was deemed sufficient to collect enough data to be able to answer the research question, keeping in mind that the purpose of this study is to identify and describe the *factors* which influence the selection of ERP systems in SMEs in the wine industry, and not the selection process. This afforded the researcher the ability to keep the study within feasible limits and deal with time constraints on the part of the organisation.

³³Financial, Logistics and Wine Operations, Wine-making, Sales, Marketing and ICT.

³⁴Bulk wine, transport, cellar services, farming, bottling and warehousing.

³⁵This includes suppliers of production materials, product consumables and services, as well as maintenance and planning.

3.2.5 Section summary

The purpose of this section is to describe the research sites of the study. With this in mind, a broad overview and history of the global and South African wine industry was presented in subsections 3.2.1.1 and 3.2.1.2. Within the latter subsection specific emphasis was placed on the economic role the wine industry plays in the Western Cape and the subsequent challenges faced by wine producers today. Following this, subsection 3.2.2 gave an overview of the wine systems software market in South Africa. Six different vendors and their products were discussed. The purpose of this was to make explicit the software functionalities currently on offer in the market and how these may influence ERP system selection by a wine producer. Next, SME-specific characteristics and constraints were discussed in subsections 3.2.3.1 and 3.2.3.2. In the latter section special emphasis was placed on how the constraints may ultimately influence the ERP system selected by an SME. Lastly, but arguably most importantly, subsection 3.2.4.1 proceeded to give an in-depth description of the organisation selected for this study. A general overview was first given, followed by a discussion on the organisational structure and state of the current ERP system in subsection 3.2.4.2. The section was concluded with a description of the selection process followed to select new ERP system in subsection 3.2.4.3.

3.3 Participants

This section focuses on the participants selected for the purpose of data collection. The discussion proceeds according to the following four themes identified by Miles & Huberman (1994, p. 27-34): setting, actors, events and process. The purpose of this section is to deliver a detailed description that will allow replication of the study by other researchers, increase the generalisability of the study, assist the reader to better understand the issue that was explored, and in doing so increase the credibility of the researcher (Bui, 2009, p. 142-144).

3.3.1 Setting

The general setting or case for the research is a wine producing SME in the Western Cape. Four different subunits were identified within the selected case. These included: Financial, Middle Management, Technical and Top-level Management. The ten participants selected for interviews were grouped accordingly. The requirements analysis meetings were conducted in the general boardroom of the Pinotage Wine Company. For this purpose, participants were grouped according to five wine-making related units: Primary Wine-making, Secondary Wine-making, Inventory Management, Bottling Production, Sales, Stock and Production Forecasting.

3.3.2 Actors

Actors were selected on the basis of purposive sampling. According to Creswell (2009, p. 178), this approach is common amongst most qualitative studies and affords the researcher the freedom and flexibility to best understand the problem under study and the research question posed. Using this approach, individuals from each of the four subunits identified above were selected. Where possible, the most senior member of each area within the organisation was selected based on the assumption that this individual would have the best knowledge of the extent of ERP system usage by his/her functional area, the problems experienced and the desired functionalities of a new ERP system. In addition to this, knowledgeable individuals on middle and lower management levels were also selected if more information about the phenomenon was needed.

The four subunits comprised ten participants in total. The Financial subunit consisted of the Financial Director (of the corporation) and the Financial Manager (of the Pinotage Wine Company). Middle Management consisted of four participants: Wine Operations Director; Cellar Master; Quality Assurance Manager, and Sales Director (of the corporation). The Technical subunit consisted of three individuals, namely the Cost and Business Systems Manager, Data Analyst and ICT Director (of the corporation). Top-level Management included the CEO (of the corporation).

A small group of external experts were also selected to increase the validity of the findings. These included two CEOs and a director of three prominent WIS/ERP system vendors, as well as an ERP system consultant who specialises in the wine industry. These participants were selected on the basis of their involvement and experience in the WIS and ERP system market, their relationship with and knowledge about the Pinotage Wine Company' current ERP system, as well as their experience with ERP system selection in the wine industry. For example, one of the CEO's and the consultant each has 6 to 10 years of experience in software consulting in the agricultural and wine industries in South Africa. Individual interviews were conducted with each of these participants to corroborate the findings obtained within the organisation.

3.3.3 Events

Observations were conducted during the requirements analysis meetings. As explained in subsection 3.2.4.3, these events formed part of the second stage of the ERP selection process. The meetings were conducted by the ICT Director and Costs and Business Systems Manager. The outcomes were as follows: identification of the current problems experienced with the system by a particular functional unit; identification of the methods employed to address these problems experienced at present, and suggestions as to possible future solutions, with no limit placed on any proposals or suggestions by any member in

the meeting. The duration of the meetings was 3 to 4 hours each. On average there were between 3 and 7 attendees at every meeting. With regards to the interviews, each participant was interviewed individually in his/her office or in a board room setting, except for the Costs and Business Systems Manager and Data Analyst, who were interviewed together due to time constraints on their part.

3.3.4 Process

The researcher commenced observations in July 2010. By this time, the organisation was already a few months into the ERP system selection process (phase two). As a result, the first requirements analysis meeting concerning Primary Wine-making had already been conducted without the researcher being present. However, the researcher attended the remaining four meetings. Participant interviews were scheduled from August 2010 with the majority of these taking place in November 2010. As noted previously, the researcher was involved with the ERP system selection process until the third phase. At this stage, enough data had been collected to answer the research question posed.

3.4 Data collection

This section focuses on the sources for collecting evidence and collection strategies used in the study. The purpose of this section is to give a detailed description of the data collection methods employed to increase credibility and replicability of the study (Bui, 2009, p. 150-153). Of the six sources of evidence for data collection listed by Yin (2009, p. 101-102), the following three were selected: interviews, observations and documentation. Each of these is discussed and their relevance for the study is indicated.

3.4.1 Interviews

Yin (2009, p. 106) suggests that interviews within case studies are more likely to take on the form of “guided conversations” than structured queries. Moreover, Yin (2009, p. 106) explains that the researcher has two duties to fulfil during the interview process: following a line of enquiry, and asking questions in a friendly and unbiased manner. According to Yin (2009, p. 106-107), this entails directing questions at two levels: questions related to specific interviewees (level one), and questions related to the specific case under study (level two).

The type of interview selected for this study is what Yin (2009, p. 107) refers to as a “focused interview”. This entails asking open-ended questions, derived from the case study protocol, in a conversational manner for a relatively limited period of time (Yin, 2009, p. 107). As with all sources of evidence, interviews have strengths and weaknesses.

Interviews are considered to be both insightful and targeted at the topics under study, but are also regarded as limited due to possible bias³⁶, poor recall³⁷ and reflexivity³⁸ (Yin, 2009, p. 102).

For the purpose of this study, the researcher decided on a semi-structured questionnaire consisting of open-ended questions. The reasoning behind this was to encourage participants to elaborate on certain topics and to afford the researcher the opportunity to investigate on a deeper level if necessary (Verville & Halington, 2002b, p. 191). The same questionnaire was used for all 10 interviewees. Introductory questions were aimed at the specific participant interviewed, followed by questions about the case under study. The interviews lasted on average an hour and were conducted either in the offices of the respective participants or in a board room setting at the Pinotage Wine Company. All interviews were conducted face-to-face and on an individual basis, except those of the Cost and Business Systems Manager and Business Analyst which were conducted simultaneously due to time constraints on the part of the interviewees. The interviews were recorded, transcribed and sent back to the interviewees for accuracy checks.

In an attempt to corroborate the findings and increase the validity of the study, a small group of external experts was also approached for interviews. Once again, a semi-structured question template with open-ended questions was used. These questions were also directed at the two levels mentioned previously. Each interview lasted an hour on average and went through the same process of verification and validation as the data obtained from the internal stakeholders. The settings for the meetings were either the offices of the individuals or public meeting places. Examples of both questionnaires are included in Appendices A and B.

The researcher acknowledges the effect bias, poor recall and reflexivity may have had on the data obtained in both instances. To correct this, it was decided to send the results of the study back to both interview groups for a second round of verification.

3.4.2 Observations

Yin (2009, p. 108-109) asserts that interviews remain, at best, verbal reports of accounts and data obtained should be corroborated by means of other sources. Therefore, the researcher opted for observations as an additional source of data. According to Yin (2009, p. 109), case studies provide ample opportunity for observation of behaviours and environmental conditions within the natural setting of the case. Yin (2009, p. 110) also considers observations as essential for providing “additional information on the topic being studied”.

³⁶On the part of both the researcher and the participant.

³⁷Inaccuracies.

³⁸Participant is aware of what the interviewer wants to hear and answers questions accordingly.

Observations are classified into formal and informal data collection activities (Yin, 2009, p. 109). Formal data collection activities refer to instances where observational instruments were used as part of the researcher's case study protocol to collect data. In the case of informal data collection activities, however, observations are not considered to be the primary form of data collection, but take place alongside other methods, for example interviews (Yin, 2009, p. 109).

Observations also have their strengths and weaknesses. Strengths include the fact that observations take place in real time³⁹, as well as the fact that they are contextual to the case studied (Yin, 2009, p. 102). Possible weaknesses may include reflexivity⁴⁰, selectivity⁴¹, and the time and costs involved (Yin, 2009, p. 102).

Observations were used to collect data from the requirements analysis meetings in stage two of the ERP system selection process. The researcher attended four of the five requirements analysis meetings as an observer. Where attendance was not possible due to time and other constraints, the meetings were recorded and later discussed with the ICT Director. The requirements analysis meetings were recorded and transcribed by the researcher. These were then presented to the ICT Director and used, with his notes, to consolidate the findings of the meetings. The results are presented in chapter 4.

The researcher attempted to compensate for the weaknesses of this method in various ways. The researcher's participation during observations were limited and general observations were conducted over the entire study period. However, it is further acknowledged that the mere presence of the researcher, the lack of fellow observers and the relatively limited time frame and scope of the study could have influenced the findings of the requirements analysis meetings.

3.4.3 Documentation

The third and last source of evidence used in the study was documentation. According to Yin (2009, p. 101), this source of evidence can take on various forms. For the purpose of this study, the following varieties of documents were used: personal notes; e-mail correspondence; written reports of requirements analysis meetings; internal project records; news clippings, and public corporate reports (Yin, 2009, p. 103). According to Yin (2009, p. 102), the strengths associated with using this source of evidence are its stability, unobtrusiveness, exactness, and the fact that it gives a broad coverage. The researcher also took cognisance of the associated weaknesses, namely difficulty of retrieval, selective bias, reporting bias and lack of access (Yin, 2009, p. 102).

The main purpose of this source of evidence in the study was to corroborate the findings

³⁹Covers events as they unfold.

⁴⁰The presence of the researcher may have an influence on the way events proceed.

⁴¹Multiple observers are often needed to obtain a broad coverage of the case.

of interviews and observations, as recommended by Yin (2009, p. 103). Documents were therefore analysed critically and not accepted “as literal recordings of events that have taken place” (Yin, 2009, p. 103). Furthermore, selective bias and reporting bias are considered to be important, as the researcher mainly corresponded with the ICT Director and relied on his input and advice for documentation. The number of documents related to ERP system selection within the organisation was limited. The possibility that the documents obtained could have been written for a specific audience and purpose (Yin, 2009, p. 105) was also kept in mind.

3.5 Protocols followed

This section describes the data collection protocols used by the researcher. Firstly, an introduction to the case study protocol is given. Following this is a description of protocols employed for each of the different data collection mechanisms. The section concludes with a discussion of the measures taken to ensure the validity and reliability of the findings obtained.

3.5.1 Case study protocol

According to Yin (2009, p. 79), it is desirable for a researcher to employ a case study protocol at all times. Doing so increases the reliability of the researcher’s findings (Yin, 2009, p. 79). Accordingly, Yin (2009, p. 81) recommends that a case study protocol consist of four sections: an overview of the case study project⁴², field procedures⁴³, case study questions⁴⁴, and a guide for the case study report⁴⁵. These recommendations were incorporated into the research design where possible.

Access to the organisation and key interviewees was gained through the ICT Director who assisted the researcher in identifying possible purposeful interviewees, endorsing the study to the organisation and scheduling interviews. The ICT Director’s support proved

⁴²An overview of the case study consists of “background information about the project, the substantive issues being investigated, and relevant readings about the issues” (Yin, 2009, p. 82). The background to the study, and the important issues being investigated were mentioned in sections 1.1 and 1.3 in chapter 1. The relevant reading to these issues was discussed at length in chapter 2, and as part of section 3.2.

⁴³According to Yin (2009, p. 85), field procedures comprise the following: gaining access to key organisations and interviewees; having sufficient resources while within the field; having a procedure for acquiring assistance when needed; compiling a data collection schedule with clear deadlines, and providing for unanticipated events.

⁴⁴Yin (2009, p. 88-86) recommends that three important points be kept in mind in this regard: Firstly, each question should be linked to the possible sources that could be used to answer it; secondly, make sure that the questions are directed at the right level of enquiry; and thirdly, be wary of possible confusion of the unit of analysis and the unit of data collection.

⁴⁵The format of the case study report is based on guidelines provided by Yin (2009), Bui (2009), Creswell (2009) and Babbie & Mouton (1998).

invaluable in this regard. The researcher further relied on his endorsement to contact external participants for the study.

Furthermore, the researcher ensured he had the necessary resources with him at all times. These included a laptop computer, dictaphone and writing material. The researcher also kept a personal journal for the duration of the study. In addition, the researcher regularly consulted with peers or referred to documentation when assistance was needed with the research process. Lastly, a schedule was compiled with data collection dates and deadlines. The researcher kept to this schedule where possible, and allowed sufficient times between deadlines to make accommodation for unanticipated events.

Arguably the most important part of the case study protocol is the questions reflecting the researcher's "actual line of enquiry" (Yin, 2009, p. 86). In this regard, the researcher used the same question template for the different interviewees in the organisation. The majority of the questions were aimed at the main unit of analysis (organisations) with a smaller number focusing on particulars concerning the different subunits. This template was adapted and used for interviews with external participants.

3.5.2 Interview protocol

Qualitative interviews are generally conducted either in a personal capacity (face-to-face), in focus groups or by means of distance correspondence, for instance over the telephone or by e-mail (Creswell, 2009, p. 179). Moreover, Creswell (2009, p. 182-183) points out that questions asked during qualitative interviews tend to be unstructured and open-ended, with the purpose of eliciting different views and opinions from participants. Based on this, and other recommendation provided by Creswell (2009), the researcher decided on a specific protocol to be used during interviews.

Each interview was recorded using a template containing the name and position of the interviewee, and also the time, place, date and relevant contact numbers. The purpose of the study, the format and aim of the questions and other instructions were clearly explained to each interviewee beforehand. The initial questions were phrased in a personal manner as a means to get the interview process going and to allow the participant to see the relevance of the subsequent questions for his/her line of work.

The researcher also left sufficient room to add/remove standard questions from the template if deeper/less enquiry was needed. Space was left between the questions, which allowed the researcher to make cryptic notes of responses and comments. At the end of the interview, participants were thanked for their time and effort. Audio recordings of the interviews were made using a dictaphone. Cryptic notes of responses were also taken in the unlikely event that the interview would not be properly recorded (Creswell, 2009, p. 183).

3.5.3 Observation protocol

According to Creswell (2009, p. 181), qualitative observations are characterised by “field notes on the behaviour and activities of individuals at the research site”. Creswell (2009, p. 181) therefore suggests that the researcher make use of a protocol for recording these activities in either an unstructured or a semi-structured manner. Based on these recommendations provided by Creswell (2009), the researcher decided on a suitable protocol for conducting observations. The protocol mandated that each observation be recorded. Recordings consisted of demographic information⁴⁶ and descriptive information⁴⁷. Initially, observations were recorded in an unstructured manner, as the novice researcher did not know what to anticipate. As the meetings progressed and the researcher gained experience and confidence in using the method, questions were formulated in anticipation of subsequent requirement analysis meetings. Reflective notes, defined by Creswell (2009, p. 182) as “the researcher’s personal thoughts” about what the researcher was observing, were also recorded in the journal mentioned.

3.5.4 Documentation protocol

For the purpose of this study, the researcher collected both public and private documents (Creswell, 2009, p. 181). Public documents comprised corporate reports available on the internet, news articles, academic journal articles, working papers, conference proceedings and books. Private documents included the ICT Director’s project notes, the BPR report compiled by an industrial engineering firm, as well as correspondence (in the form of notes and e-mails) between the researcher and participants, amongst others. Descriptive and reflective notes were also kept in the researcher’s personal journal for the duration of the study.

3.5.5 Principles of data collection followed

According to Yin (2009, p. 114-124), the sources of evidence discussed above can be maximised to their full potential by following three principles. These include: using multiple sources of evidence, creating a case study database, and maintaining a chain of evidence. Each of these will be discussed in brief and their relevance to the study indicated.

Yin (2009, p. 114) claims that many different sources of evidence ought to be used during case study data collection. This allows the researcher to “address a broader range of historical and behavioural issues” (Yin, 2009, p. 115). According to Yin (2009, p. 115-116), the advantages associated with such an approach include: the development of

⁴⁶Time, place, date, unit, number, and names of attendees.

⁴⁷What was discussed and drawn on the white board during the specific requirements analysis meeting.

“converging lines of enquiry”, a process of triangulation and corroboration. Yin (2009, p. 116) further states that data triangulation only truly takes place when facts and/or events are supported by more than one source of evidence.

As has been explained in section 3.4, three different sources of evidence were selected for data collection in this study: interviews, observations and documentation. This afforded the researcher the opportunity to corroborate findings from the interviews with data collected during observations of requirements analysis meetings and through documentation.

The creation of a database for organising and collecting data in a case study, has for the most part been ignored in past case study research (Yin, 2009, p. 119). Yin (2009, p. 119) states that this is a major shortcoming of the case study design, which needs to be corrected through future research. With this in mind, a number of recommendations provided by Yin (2009, p. 119-122) were incorporated in this study. Firstly, the case study notes, in their different forms, were organised according to the major themes of study and stored in a single place to increase accessibility. Secondly, the same principle was applied to documentation collected during the course of the study and an annotated bibliography of these documents was compiled. Lastly, the researcher compiled narratives on completion of data collection which consisted of open-ended answers to the research question. The rationale behind this was to “document the connection between specific pieces of evidence and various issues in the case study” (Yin, 2009, p. 122).

The researcher further attempted to maintain a chain of evidence during the course of research (Yin, 2009, p. 122). According to Yin (2009, p. 122), the purpose of this principle is to allow the reader of the case study report to be able to trace the chain of evidence in either direction (backwards or forwards). Keeping this in mind, the researcher attempted to link the case study report to the case study database. This in turn was linked with the actual evidence and circumstances of data collection (which is consistent with the protocols described in the study). Finally, a link was made to the case study questions asked at the beginning of the study. This would allow an external observer to move from one phase in the case study process to another, aware of the cross-referencing to methodological procedures and resulting evidence (Yin, 2009, p. 123-124).

3.5.6 Validity and reliability

The purpose of this subsection is to make clear the assumptions about validity and reliability held by the researcher and how these influenced the design of the study. Firstly an account of what constitutes validity and reliability in the context of qualitative research is given. Maxwell (2002, p. 37) notes that much of the critique against qualitative research has centred around the legitimacy of validity and for this reason “any account of validity in qualitative research, in order to be productive, should begin with an understanding of

how qualitative researchers actually think about validity". Following this, the approaches taken by the researcher to increase the validity and reliability of the study are discussed in this subsection.

3.5.6.1 Definitions of validity within qualitative research

According to Maxwell (2002, p. 41), validity in its broad sense can be defined as the "relationship between an account and something outside of that account". This concept of validity allows for different accounts from different perspectives which are all considered to be equally valid (Maxwell, 2002, p. 41). Maxwell (2002, p. 42) elaborates on this as follows:

The applicability of the concept of validity presented here does not depend on the existence of some absolute truth or reality to which an account can be compared, but only on the fact that there exist ways of assessing accounts that do not depend entirely on features of the account itself, but in some way relate to those things that the account claims to be about.

In other words, validity is regarded to be primarily concerned with accounts (not data) and considered to be relative due to an underlying relative understanding (Maxwell, 2002, p. 42). Based on this argument, Maxwell (2002, p. 43) proceeds to define five "broad categories of understanding" and five corresponding validity types. Four of these types are relevant to this study and include: descriptive validity⁴⁸, interpretive validity⁴⁹ theoretical validity⁵⁰ and generalisability⁵¹.

⁴⁸Descriptive validity refers in brief to the "factual accuracy" of the accounts (Maxwell, 2002, p. 45). For instance, providing a valid description of the setting, events and behaviours studied (Maxwell, 2002, p. 45). This includes what Maxwell (2002, p. 45-46) defines as "primary descriptive" and "secondary descriptive" validity. The first being "the descriptive validity of what the researcher reports having seen or heard", while secondary descriptive validity are accounts which were inferred from other data. Any threat to descriptive validity can be addressed by access to the data contested (Maxwell, 2002, p. 49).

⁴⁹Interpretive validity concerns the inferences that can be made from the "words and actions of participants in the situations studied" (Maxwell, 2002, p. 49). This concerns the meaning derived from engagement of people with the setting, events and behaviours validated by descriptive validity. Maxwell (2002, p. 48) further points out that this type of validity is especially relevant for research done in the interpretivist paradigm, where the aim is to "comprehend phenomena not on the basis of the researcher's perspective and categories, but from those of participants in the situations". The qualitative researcher should therefore be aware of the role he/she plays in constructing accounts of participants' meaning using, amongst other evidence, the participants' own accounts (Maxwell, 2002, p. 49).

⁵⁰Theoretical validity differs from descriptive and interpretive in that "it goes beyond concrete description and interpretation and explicitly addresses the theoretical constructions that the researcher brings to, or develops during, the study" (Maxwell, 2002, p. 50). Moreover, theoretical validity refers to the explanation, description and/or interpretation of the function of a particular account: "theoretical validity thus refers to an account's validity as a *theory* of some phenomena" (Maxwell, 2002, p. 51). As Maxwell (2002, p. 52) further indicates, theoretical validity concerns "the legitimacy of the application of a given concept or theory to established facts, or indeed whether any agreement can be reached about what the facts are".

⁵¹Generalisability is defined as "the extent to which one can extend the account of a particular situation or population to other persons, times or settings than those directly studied" (Maxwell, 2002, p. 52). The

3.5.6.2 How validity was ensured in the study

The researcher incorporated various validity strategies to ensure validity was properly accounted for. The multiple validity strategies chosen were: triangulation; member-checking; thick descriptions; presenting negative or discrepant information; spending a prolonged time in the field; peer debriefing, and clarifying the bias of the researcher (Creswell, 2009, p. 191-192). The aim with these approaches was to collectively uphold and account for descriptive validity, interpretive validity, theoretical validity and generalisation, as set out in subsection 3.5.6.1.

As part of the research design, the researcher triangulated different data sources to build a justification for the themes discussed in this study (Creswell, 2009, p. 191). The sources included interviews (with internal and external experts), observations and critical document review and analysis. The converging of these sources and perspectives contributed to the descriptive, interpretive and theoretical validity of the study. Secondly, member checks were performed. The recorded interviews were transcribed and sent back to the individual interviewees to check for descriptive accuracy. Interpretive validity was increased when members were asked to explain the meaning of certain statements and elaborate on points made during the interviews.

The researcher further made use of rich, thick descriptions of the research settings and the phenomena under study. This increased the interpretive validity of the findings, as it helped the results to become “more realistic and richer” (Creswell, 2009, p. 192). Taking a lead from Maxwell (2002, p. 108-109), the importance of researcher bias and reactivity were acknowledged upfront and the impact and ways of dealing with this were explained in chapter 1. Furthermore, sufficient time (approximately 8 months) was spent in the field and the researcher attended most of the requirements analysis meetings to be able to develop an “in-depth understanding of the phenomena under study” (Creswell, 2009, p. 192). In addition, negative or discrepant information was noted during data collection and is presented in chapters 4 and 5. Where possible, the researcher also consulted with peers on matters concerning the study (Creswell, 2009, p. 192).

3.5.6.3 Reliability and how it was ensured

Reliability in a qualitative context can be defined as the use of an approach by the researcher which stays “consistent across different researchers and different projects” (Gibbs quoted in Maxwell, 2002, p. 190). Moreover, Yin (2009, p. 45) explains that reliability ensures that if the same case study were to be conducted again and the same procedures

author divides this into two aspects for the purpose of qualitative research: internal generalisability and external generalisability (2002, p. 53). Maxwell (2002, p. 54) deems the prior most appropriate for the purpose of qualitative research: “internal generalisability in this sense is far more important for most qualitative researchers than is external generalisability because qualitative researchers rarely make explicit claims about the generalisability of their accounts”.

employed by different investigators, these individuals should be able to derive the same findings and draw similar conclusions. With this in mind, the researcher selected the following reliability strategies: Transcripts were checked for obvious errors and a shift in the meaning of codes during the coding process was compensated for by constantly comparing data with the codes/memos of the codes and their definitions (Gibbs quoted in Maxwell, 2002, p. 190).

Mouton (1996, p. 157) further recommends the use of anonymity as a means of ensuring reliability during data collection. In the first instance, the organisation studied requested to remain anonymous and this request was respected by removing all instances of the organisation's name from the research and replacing these with a pseudonym. The real names of the participants were also replaced with their organisational titles. In addition, Yin (2009, p. 45) recommends the use of case study protocol and the establishment of a case study database that will aid to document the procedures for repetition by others. In the case of this study, the case study protocol was followed as far as possible, and the relevant documents stored and procedures documented⁵².

3.6 Data analysis

This section describes the methods and procedures that were used to analyse the data collected. The aim of this section is to lay the foundation for the reporting of the findings of the study and make this “meaningful” to the reader (Bui, 2009, p. 154). Firstly, a number of generic principles about data analysis in qualitative studies are discussed. Following this, the three different methods used to analyse data are explained step by step. As recommended by Bui (2009, p. 153), every decision regarding data analysis was made with the goal of answering the research question posed at the beginning of the study.

3.6.1 Data analysis principles in qualitative research

Creswell (2009, p. 183) views data analysis as a process in which the researcher has to make sense “out of text and image data” collected. Moreover, Creswell (2009, p. 183) explains: “it involves preparing the data for analyses, conducting different analysis, moving deeper and deeper into understanding the data, representing the data and making an interpretation of the larger meaning of data”. Based on this definition, Creswell (2009, p. 184) lists a number of generic principles he regards as inherent to the process of qualitative data analysis: It is an ongoing process which takes place concurrently with data collection; it involves collecting open-ended data and analysing it; it extends beyond mere analysis of

⁵²See subsections 3.5.1 and 3.5.4.

themes and perspectives, but also involves a procedure unique to the strategy of enquiry chosen; it follows steps from specific to general, and consists of multiple levels of analysis.

The researcher decided to make use of the six steps identified by Creswell (2009, p. 185-190) to analyse the data of the study. Step one involved organising and preparing the data to be analysed. During this step, the interviews and observation recordings were transcribed and together with the data obtained from documentation, arranged into different types according to source. In step two, the researcher proceeded to read through all the data collected. Creswell (2009, p. 185) explains that the rationale behind this step is to gain “a general sense of the information and to reflect on its overall meaning”. Following this, the researcher began analysing the data using a coding process. Three different methods were used to code the data, namely normal coding, pattern coding and memoing. In step four, the researcher generated themes and a description of the setting and people involved and headings were created based on the themes identified. Step five entailed showing the multiple perspectives involved by citing diverse quotations and being specific with regards to evidence as part of the discussions. In the last step, the findings were interpreted by comparing them to the factors identified from the literature in chapter 2 and conclusions were drawn.

3.6.2 Data analysis methods used

Data analysis in this study proceeded from the basis of two important assumptions. Firstly, data appeared in a basic word format as opposed to numbers (Miles & Huberman, 1994, p. 51). Secondly, data were processed and refined through other processes (mentioned earlier) to render it in a readable and clear “text” for the researcher to analyse (Miles & Huberman, 1994, p. 51).

The data analysis methods employed in the study included coding, pattern coding and memoing (to a lesser extent). According to Miles & Huberman (1994, p. 56), codes can be defined as follows: “codes are tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study”. These codes are linked to words, phrases, sentences and in some instances, even paragraphs and used to organise and retrieve chunks of information (Miles & Huberman, 1994, p. 56). Miles & Huberman (1994, p. 66) further indicate that coding is well-suited to qualitative analysis as it supports ongoing analysis through the duration of the study.

The idea behind coding is to focus the researcher on the meaning behind the words and not the words themselves (Miles & Huberman, 1994, p. 56). A system of logic also needs to underlie the categorising of the chunks of information and the codes must indicate some form of relation with each other (Miles & Huberman, 1994, p. 62). Important characteristics of codes include the following: Coding takes place at different levels of analysis (i.e. descriptive or inferential), codes are not created at once, but throughout

the process of analysis, and codes are astringent⁵³(Miles & Huberman, 1994, p. 56).

The researcher proceeded to code the data based on recommendations offered by Miles & Huberman (1994, p. 59-66). Firstly, factors and themes identified from literature at the end of chapter 2 were used to compile a provisional list of codes. In naming the codes, it was decided to use a name closest to the concept the code describes and where further clarification was needed, operational definitions were provided. This list was then used when assigning codes manually to transcriptions from the interviews and to observations. An attempt was made to analyse each interview and observation directly after it was conducted, before proceeding to the next. Subsequently, the list of codes was augmented and adapted as the study progressed.

The first-level coding described in the previous paragraphs was supplemented by pattern coding. According to Miles & Huberman (1994, p. 69), the process of “pattern coding is a way of grouping those summaries [first-level codes] into a smaller number of sets, themes or constructs”. This method of data analysis performs various important functions. Firstly, it reduces data to less analytical units, thereby assisting the researcher to analyse the data while still collecting it (Miles & Huberman, 1994, p. 69). And secondly, it assists the researcher to augment his or her cognitive map of local incidents and interactions (Miles & Huberman, 1994, p. 69).

Pattern coding was applied in the study based on recommendations provided by Miles & Huberman (1994, p. 70-72). Firstly, patterns emerging from the literature were added to the list of provisional codes, and applied to transcriptions of interviews and observations. After that, the pattern codes were assessed with each secession of data collection, new ones were added and the relevant pattern codes qualified by specifying the conditions under which they hold.

Pattern coding was further used in conjunction with another data analysis method referred to as memoing. According to Miles & Huberman (1994, p. 72), memos are conceptual in nature: “they don’t just report data; they tie together different pieces of data into a recognisable cluster, often to show that those data are instances of a recognisable concept”. Explained in a different way, memoing goes a step further than coding in that it links an idea to the coding system (Miles & Huberman, 1994, p. 73). In this way it assisted the researcher in capturing thoughts as they occurred during data collection, to draw conclusions and to revise the coding system on the whole (Miles & Huberman, 1994, p. 74).

⁵³“Pull together” different information into a single theme (Miles & Huberman, 1994, p. 56).

3.7 Chapter summary

The purpose of this chapter is to explain the research design employed by the researcher to collect and analyse data with a view of answering the research question posed in chapter 1. Firstly, the research setting was described in detail in section 3.2. It commenced with a description of the international and South African wine industry. Next, it covered the different WIS software packages available on the market and discussed characteristics and challenges faced by SMEs and how these influence their selection of ERP systems. Accordingly it concluded with a description of the organisation selected for the study. Subsequently, section 3.3 was focused on the participants selected for the study. The discussion was presented in four themes, namely setting, actors, events and process. Following this, the different sources of evidence and data collection strategies were covered in section 3.4. This section specifically focused on interviews, observations and documentation as data collection strategies. After this, the protocols followed for these strategies and the case study as a whole were explained in section 3.5. This included a discussion on the approaches taken by the researcher to increase the validity and reliability of the findings. To conclude, section 3.6 focused on how data in the study was analysed and the different methods used. The results of the data analysis are presented and discussed in the next chapter.

Chapter 4

Presentation and Discussion of Results

4.1 Introduction

As previously stated, SMEs experience difficulties with selecting and implementing ERP systems as a result of size-specific and industry-specific limitations. The purpose of this study is to define and describe these size-specific and industry-specific factors an SME in the wine industry of the Western Cape considers when selecting an ERP system. Accordingly, a comprehensive set of ERP system selection factors were identified from the relevant body of literature and summarised in chapter 2. This was then used as a point of departure for the collection and analysis of qualitative data as part of the case study research design discussed in chapter 3. It is now the purpose of this chapter to present the reader with the results obtained and a brief discussion thereof.

The results obtained are presented in narrative and tabular formats, as befits a qualitative study (Bui, 2009, p. 161). The narration is structured according to the five major factor themes to emerge from the data analysis (Bui, 2009, p. 180): technical, organisational, user-related, vendor-related and industry-related. Within each of these, a summary of interview data are firstly presented in tabular format using the four case study subunits identified in chapter 3. Following this is a narrative summary of the data obtained through interviews with participants, observations and interviews with external experts. The researcher placed emphasis on rich, thick descriptions of the factors and the context in which the factors were identified (Bui, 2009, p. 181). Support and justification for the factors identified are given in the form of quotes by participants and discussions where possible (Bui, 2009, p. 181). However, to honour the organisation's request for anonymity, no in-text or bibliographical references of the interviews were included. Additional factors to emerge from the analysis are presented in tabular format in Appendix E.

4.2 Technical factors

4.2.1 Technical factors identified through interviews

Table 4.1: Summary of technical factors

SUBUNIT	DATA FACTOR	FUNCTIONALITY FACTOR
Financial	Integration: Manual re-consolidation of data Ease of finding data: Get quick answers to questions (visibility of data) Flexibility Should contain "best practices" for the industry Time-delay: In repairing data mistakes	Dated Limited/missing functionalities: Have to be completed outside of the system
Middle Management	Integration: Manual re-consolidation of data Data not in real-time Faulty capture and replication of data Fragmented data: Cannot easily trace history of products Not detailed enough: Not enough fields in tables to capture data Does not fulfil in data needs: Cannot give periodic information on sales data Inaccuracy of data: Financial, cost and stock Data not in real-time. Need for easy finding of data: Get quick answers to questions	Dated Integration: Internal and external systems Limited/missing functionalities: Forecasting; "what-if" analysis; demand requirements planning; cost planning; product specification management; quality control; business intelligence; "freeze" of processes Too labour intensive Flexibility: Rigid with data input and flexible with data output Needs to be accessible from outside the office Traceability Control of authorisation to overwrite processes in the ERP system Too process-dependent

Table 4.1: Summary of technical factors

SUBUNIT	DATA FACTOR	FUNCTIONALITY FACTOR
Technical	Integration: Flow of information of data	Flexibility: Scalability for decision-making purposes; needs to be rigid with data input and flexible with data output and reporting
	Ease of finding data	Integration: Internal and external systems
	System should allow organisation to be efficient in how it handles data	Limited/missing functionalities: Production lot tracking; warehousing; reporting; exploration/interrogation of data Dated Limit human intervention More customisable Time delay: Time to report, month-end closures Robust Stable Trustworthy Transparent processes Allow for data collaboration
Top-level Management	Accurate	Automation: Systems need to automate business processes
	Ease of finding data: Must be efficient	Flexibility: Not too flexible Limit human intervention

By and large the majority of ERP system selection factors identified by participants were technical in nature. As a means of simplification, these factors have been grouped in the above table based on their connotation with data or functionalities of the ERP system. With regards to data, participants indicated a lack of data integration and data accuracy in the organisation as the biggest concern. The ERP system does not fully integrate with internal business systems or external systems of external stakeholders, necessitating employees to intervene and manually transfer the data between systems on a regular basis. As a result data are often inaccurate and delayed and employees find it difficult to make timely and accurate planning and forecasting decisions for their respective departments.

Flexibility of the ERP system was the second major technical concern. Certain participants were of the opinion that the ERP system should be more flexible in how it outputs data, allowing them the flexibility of manipulating this to suit their dissimilar

data reporting needs. On the other hand, some participants argued strongly against an ERP system which is excessively flexible and allows for too much manual participation by employees. Accordingly, they suggested that a balance be struck between flexibility for data output and rigidity for data input.

In addition, participants clearly articulated that the current ERP system is limited in or missing certain important functionalities, specifically with regards to forecasting, product tracing, cost planning and stock tacking. In an effort to address this problem, the organisation decided to customise the ERP system themselves as they felt the vendor was not adhering to their requests for change. Where customisation did not prove effective enough, additional software was introduced into the organisation to provide needed functionalities: Cognos¹, Demand Solutions² and Microsoft Excel spreadsheet software³.

For this reason, users started moving certain tasks from the ERP system and completing them using the additional software. Examples in this instance include: product specifications⁴, wine blends, wine barrel and cost tracking. The lack of integration between the ERP system and other business systems have also contributed to users making use of alternative software solutions. A separate database, for example, is used to track the value added services and cost of contracted wines⁵. Over time, more and more data were moved outside the ERP system, increasing the risk of data inconsistencies and anomalies. As the relationship with the ERP system vendor deteriorated and the organisation did not update the ERP system, the software became dated and the gap between what the organisation needed and what the ERP system could deliver increased over time. For this reason, many of the factors raised by participants in the paragraphs below are in a way related to the organisation's decision to customise.

Within the Financial subunit, the Financial Director's biggest frustration was the lack of data integration in the ERP system throughout the different production stages when a new product is produced. According to him, "all of the information is not required to be placed in the ERP system when placing a new product into the system and this creates problems later on." In other words, the ERP system is regarded as being too flexible when it comes to data input by users. As a result, users complain of data inconsistencies when they have to complete subsequent production tasks. Nevertheless, the Financial Director doubted whether this is entirely an ERP system issue and suggests streamlining organisational business processes as a possible means of solving the problem.

In the same way, the Financial Manager was frustrated with the lack of data integration between the ERP system and other business systems used in the organisation. As a result, data now need to be manually re-consolidated between different business systems, further

¹Used for business intelligence functions.

²Used for demand requirements planning.

³Used for planning and "what if" scenario analysis.

⁴Due to a lack of visual support for the product label library in the ERP system.

⁵Wines procured by Secondary Wine-making.

contributing to time-delays and data inconsistencies. Moreover, she argued that the ERP system could benefit from an improved data interrogation function: “The most important [improved functionality], from an operational point of view, is to be able to write a query, with ‘drill-down’ functionality, and get a quick answer”.

Participants from the second subunit, Middle Management, to a large extent verified the factors identified by the Financial subunit. Limited/Missing functionalities such as “what-if” planning and analysis, demand requirements planning, cost planning, and product specification were amongst those considered by the Director of Wine Operations to be most important. His department also found ways to complete these tasks without using the ERP system, leading to data inconsistencies and the need for manual re-consolidation of data from time-to-time. He further emphasised the need for integration of the ERP system with third-party systems: “How the new [ERP] system will integrate with other systems will be an underlying factor”.

Furthermore, the Cellar Master was of the opinion that the current ERP system is too fragmented with regards to data: “The ERP system is very fragmented. You cannot easily draw the history [of the grapes] from vineyard to wine”. He expressed the need in his department for detailed information to be immediately available from the moment the grapes are planted until the wine is sent off to be bottled. Moreover, data should be available in real-time and the tables of the ERP system should contain adequate data fields to accurately capture all the data the department requires.

Equally important, the Quality Assurance Manager stated that the ERP system is lacking in quality control functionalities. According to her, there is a definitive gap between the requirements of her department and the offerings of the ERP system: “Quality [control] does not currently form part of the ERP system, although there is space to include it”. Moreover, she expressed the need to be able to trace a product through the production cycle and identify non-conforming products. She also emphasised that she would prefer to be able to “freeze” the system at certain stages, allowing only designated persons the authorisation to overwrite certain process flows: “The biggest problem is that the system is not able to ‘freeze’ at certain stages. All the required data thus does not have to be in the [ERP] system for it to proceed to the next process. People can overwrite this”.

The Sales Director confirmed that the ERP system does not integrate easily with other business systems used in the organisation and struggles with “what-if” analysis and sales history in particular: “The system for example would not be able to tell you what the company sold in the same period last year for a specific country.” He pointed out that his department is expected to make quick and educated decisions regarding sales forecasting and therefore needs accurate data readily available. The ERP system also needs to be accessible from outside of the organisation to allow him and his staff to supply customers

with information on demand, regardless of where they find themselves.

Within the Technical subunit, the Costs and Business Systems Manager agreed that data integration and lacking functionalities were a concern: “For me the biggest constraint is the reporting and it [the ERP system] is not very integrated in terms of the flow of information”. Systems integration with external third-party systems to implement warehousing and production lot tracking functionalities was specifically mentioned. The ERP system is also not flexible enough in the opinion of the Data Analyst. According to him, the ERP system does not allow users to continue with a production task, unless the previous task was completed: “You can’t do the sales orders without the transfers and you can’t do those before the stock is there, as a result of the production update”. At the same time, he expressed the need for the ERP system to be more customisable from a user’s perspective. Both the Costs and Business Systems manager and Data analyst also agreed that the strength of the current ERP system lies in its wine-making functionalities.

In addition, the ICT Director was of the opinion that the current ERP system does not allow the organisation the much-needed flexibility and scalability to make “short turnaround decisions”. He summarised the views of many participants when arguing that a balance needs to be struck between the flexibility and rigidity of the system: “On the input side it needs to be rigid, but on the output side it can be flexible”. This will allow different participants to manipulate the output data based on their particular decision-making needs.

On the other hand, the CEO in the Top-level Management subunit cautioned against a system “that is overtly flexible”. In his opinion, the ERP system should be “data in and data out, with an amount of flexibility.” In other words, the ERP system should provide structure to the business processes by automating and regulating them as far as possible. This may in turn limit the extent to which users can intervene in and overwrite these processes, thereby limiting problems such as data anomalies and inconsistencies. He did, however, value the subjective human input that goes into producing a creative product such as wine: “The product the Pinotage Wine Company produces is influenced to a great extent by the team that produces it. Therefore human intervention can be a good thing, but it needs to be limited”.

4.2.2 Technical factors identified through observations

Analysis of observation data revealed factors similar to the ones identified by participants. The majority of factors identified in this regard are also technical in nature: Limited/missing functionalities; traceability of products; authorisation of access rights; integration with external third-party systems; an ERP system too dependant on the completion of tasks; greater flexibility, and a need for accurate and real-time data. In addition, the various functional units identified current time-delays in month-end and year-end roll-

back of the ERP system as a big constraint that needs to be corrected. Equally important is the need expressed for increased automation with regards to systems data archiving and the use of hand-held devices in the wine cellar.

4.2.3 Technical factors identified through interviews with external experts

Data obtained from the interviews with external experts corroborates the findings of the interviews and observations. The external experts acknowledged the need for the ERP system to be able to perform certain functionalities such as stock control, cost control, quality control and sales forecasting and planning. Furthermore, the need for traceability of products and integration with external third-party systems was emphasised.

Particularly noteworthy is the belief of one stakeholder that the ERP system needs to “understand” the process of wine-making and therefore exhibit a certain amount of flexibility in the way it operates. Moreover, he argued that the ERP system has to accommodate the winemakers and cannot contain too many rules: “You have to make your [ERP] system extremely flexible from a processing point of view-not to place any restrictions on these guys [the winemakers] as they can decide to change their minds on the spur of the moment”. Another expert was also of the opinion that the environment the organisation operates in changes from year to year, and therefore continued maintenance of the ERP system is important to meet the requirements of the client organisation.

4.2.4 Section summary

The aim of this section is to make explicit the predominantly technical factors identified during data analysis. Participants from the four subunits in particular identified limited/missing functionalities, data and systems integration and a balance in the flexibility of the ERP system as most important. These findings were largely corroborated and augmented by data analysed from observations of requirements analysis meetings and interviews with external experts. The subsequent section focuses on organisational factors identified.

4.3 Organisational factors

4.3.1 Organisational factors identified through interviews

Table 4.2: Summary of organisational factors

SUBUNIT	FACTOR
Financial	Not just a systems issue: Evaluate ERP system and other business systems ERP system should support business processes All data to end up in ERP system
Middle Management	Integrate all business processes Support for manual quality control processes
Technical	Business is inefficient in terms of information processing and reporting Need for readiness of information for decision-making purposes ERP system does not fulfil in the organisation's information needs Lack of focus in business systems employed Strength of ERP system: Wine-making functionalities
Top-level Management	Some problems might be management-related ERP system should support organisational efficiency ERP system project is regarded as business-related and not technology-related

In addition to the technical factors mentioned in the previous section, participants identified a host of organisation-related factors. As mentioned in chapter 3, the organisation places a high premium on sustainable business practices and empowering its staff through training and development. As part of its continued growth, the organisation has undergone significant restructuring in the past years in an effort to align its business practices with this vision. Accompanying this was a shift in business strategy from producing a variety of lower quality and cost bulk wine, to focusing mostly on higher-quality premium class red wines.

This restructuring has, however, not been without its difficulties, and two important organisational issues have surfaced in the process, namely organisational communication and employee work balance. Data suggest a lack of effective intra-departmental and inter-departmental communication between employees. As a result, employees are not aware of how their work relates to that of fellow employees and feel overwhelmed by the amount of work expected of them. This lack of collaboration between employees explains the general perception amongst them that if they want to have something done, they have to do it themselves. Consequently, meetings are considered to be a waste of time and plans are

not followed up on.

The restructuring has further revealed a need for clarification of ownership of business processes. Data indicate that many employees are unsure of the roles they have to fulfil in different production processes and where departments' responsibilities begin and end. Moreover, this evidence suggests a need for integration of business processes as part of ERP system selection and preceding ERP system implementation.

Furthermore, data suggest that the organisation relies significantly on external stakeholders to be able to execute their business processes in time. The organisation currently relies on them to a great extent to complete its bottling, warehousing and distribution processes. A number of issues are causing this relationship to be less than satisfactory. Firstly, external stakeholders use different production codes from that of the organisation and these need to be manually re-consolidated from time to time. Secondly, the ERP system of the organisation is unable to effectively integrate with the suppliers' systems. As a result, data interchange between the organisation and external stakeholders also takes place manually. Third parties often do not honour requests to complete data interchanges in time, causing 48 hour time-delays in production processes and inaccuracies in stock data. Apart from improving the technical integration of the ERP system, these issues can further be addressed through adequate SLAs with external stakeholders.

There is also a lack of focus and policy with regards to business systems implementation and use in the organisation. Instead of fully exploring the capabilities offered by the ERP system, the organisation opted to customise the ERP system and introduce additional software applications. In this way, short-term ad hoc software solutions were provided to the pressing needs of the different departments, without a coherent long-term plan for the entire organisation. Employees also make use of different software applications to report and format data for decision-making purposes in their respective departments.

The lack of business systems focus is further evident from the conflict between different projects in the organisation. The Financial department has instigated the design of another software application in an effort to consolidate the lack of integration between the different applications. This financial software project contends with the ERP system selection project for funding from the executive committee of the organisation. Inadvertently, this has led to tensions between the project manager of the ERP system selection project (ICT Director) and the project manager of the financial software project (Financial manager), possibly compromising the success of the ERP project. It has further been noted that the organisation is not in a position to afford a new ERP system and that no budget has yet been approved for the ERP system project.

The lack of focus can be ascribed to the role business systems are seen to play in the organisation. In the past, the organisation did not regard its information system as being imperative to realising organisational strategy and achieving operational objectives. The

system is fragmented and does not allow for collaboration between employees. Furthermore, data suggest that employees in the different departments have different expectations of the role the ERP system and other software are to play in the organisation. (Some of which, as indicated in the paragraphs below, are unrealistic at best.)

Against this background, many of the participants identified factors which corroborates the issues mentioned. The Financial Director was of the opinion that many of the issues raised during the selection process are organisational in nature and could be addressed through streamlining business processes. Moreover, according to him the organisation not only has to look at the ERP system as part of selection, but also has to evaluate its use of other business systems and how these support business processes. In line with this, the Financial Manager suggested the ERP system needs to support as many of the business processes as possible to the extent all data ends up in the ERP system. If this were done, many of the business systems used in addition to the ERP system could be discarded, she argued.

The Sales Director from the Middle Management subunit agreed that the ERP system should foster integration of business processes in the organisation. He believed that the system will be successful if it integrates “all facets of the business so that one can really formulate plans, without having meetings and pulling in lots of different people”. This also includes support for quality control processes. In addition to being a technical issue, the Quality Assurance Manager added that no ERP system would be able to fully comply with all quality control requirements. Many of these requirements involve a human factor and cannot be automated as they require designated employees in her department to perform specific tasks in order to comply. Mainly for this reason, the organisation developed a manual quality control system operating alongside the ERP system which comprises different quality control standards the organisation ascribes to.

The ICT Director asserted that the organisation is at present inefficient in the way it processes and reports information. This can partly be attributed to the ERP system: “We have to take cognisance of the fact that...business processes have been designed with the current ERP system in mind that may not be applicable anymore”. However, data indicate that this is as much an organisational issue as it is a systems one. The ICT Director explained that the lack of focus in the business systems department has led to the development of additional software applications to be used in conjunction with or in the place of the ERP system. This compromised the organisation’s “readiness of information for decision making and efficient information processing”.

The CEO acknowledged that some of the problems in the organisation might be related to departmental and structural issues. According to him, “the business itself has been restructured and re-engineered during the last 24 months and as a result the strategy has changed”. Consequently, business processes, employee roles and departmental functions

have not been figured out properly. For the CEO, these issues were just as important as selecting new ERP system. At the same time, he felt that the organisation needs an ERP system that supports the organisation “99.9% effectively”, if it is to succeed in its goals.

4.3.2 Organisational factors identified through observations

The data analysed from observations verify that organisational issues are as much of a problem as the technical shortcomings identified. Moreover, it was particularly noted that a standard policy for decision-making reporting is needed in the organisation. Employees in the various functional wine production units expressed the need to know when to use a certain software to complete a specific task and how to report data for decision-making purposes.

Data further confirmed that the ERP system and other business systems have not been exploited to their full potential. This led to the various functional wine-producing units employing additional software, such as Cognos and Demand Solutions for business intelligence and demands requirements planning respectively. Various in-house customised software mechanisms, consisting mostly of Microsoft Excel spreadsheets, were also developed to assist with intra-departmental planning and “what if” scenario analysis.

The third major factor to arise from data analysis concerned external stakeholders. The different functional wine producing units indicated that the completion of their production processes internally depends significantly on the timely completion of documentation by external stakeholders. This confirmed the importance of adjusting the SLAs between the organisation and suppliers to address these issues.

4.3.3 Organisational factors identified through interviews with external experts

External experts agreed that organisational business process integration should form part of ERP system selection and precede ERP system implementation. This means that once the organisation has selected an ERP system, organisational processes need to be sorted out and managed before implementation can begin. One expert in particular remarked that there has been a degree of business process re-engineering needed at all the implementations he was involved in: “Sometimes you have guys whose [business] processes are conspicuous and you have to assist them in improving this”.

Another expert was of the opinion that 80% of an organisation’s requirements can be addressed by any given ERP system available. However, only a proper “gap analysis” of where the organisation is and where it wants to be can determine how the organisation can focus on expanding the remaining 20%. These are the factors which distinguish it from other organisations and should drive the ERP system selection process. It was

further noted that organisations may differ in the manner in which they choose to do their reporting and compile documentation, and that assistance by ERP system vendors should be provided in this instance.

4.3.4 Section summary

The aim of this section is to expand the list of technical factors with factors related to the organisation studied. Data analysed from participant interviews, observations and external experts confirmed that the selection process is as much an organisational issue as it is a technical systems one. In this regard specific emphasis was placed on the lack of proper intra-departmental and inter-departmental communication, a need for organisational policy to provide a standard for decision-making reporting, managing and integrating business processes as part of ERP system selection, and addressing external stakeholder issues through proper SLAs. The next section focuses on user-related factors identified.

4.4 User-related factors

4.4.1 User-related factors identified through interviews

Table 4.3: Summary of user-related factors

SUBUNIT	FACTOR
Financial	User-friendly ERP system should support business processes Easy and quick to use Meets the information need of users: Reduces time users spend searching for data they need in the system
Middle Management	User-friendly: Visual display of information Easy, quick to use: Needs to simplify tasks for users; IT experts should not be needed to retrieve information and do analysis Awareness of the human component: Human intervention can never be fully removed Needs to meet the information needs of the users
Technical	Awareness of the human component: Skills level of workers taken into consideration; negative perception of users about the ERP system decreased; obtaining user buy-in for the project

Table 4.3: Summary of user-related factors

SUBUNIT	FACTOR
	Needs to meet the information needs of the users: data are presented in a way that is useful to different users; users want to manipulate data output User-friendly: Data input easy
Top-level Management	Needs to fulfil in the information needs of the users: Users in the right places need the right information

A number of factors related to the users of the ERP system were also identified from interview data. Most participants interviewed were of the opinion that the current ERP system does not meet the information needs of its users and is hence perceived as being user-unfriendly. In other words, the ERP system is not easy and quick to use, users often cannot find the data they are looking for and need to call in the help of IT experts to assist them, data need to be displayed visually and tasks in the ERP system must be simplified so that they are easier and less time-consuming to complete.

These factors, together with the technical shortcomings mentioned, have motivated users to remove functionalities from the ERP system over time. Consequently, they develop ad hoc shortcut solutions using alternative software found to be less cumbersome. An example in this instance is the BOM functionality. This can be completed in the current ERP system, but users opted to use Microsoft Excel spreadsheets software instead mostly because they find it easier and quicker.

The extent to which the ERP system depends on user involvement was also acknowledged as an issue. As indicated in the two previous sections, the ERP system relies significantly on user involvement and manual input to function properly. For this reason, absence or cessation of certain key employees has an adverse effect on the workings of the ERP system, resulting in the delay of certain production processes. Users also often manually enter wrong data into the ERP system. The data are then replicated through the system and affects the workings and decisions of various other employees further down the production line. As a result of the complexity of the ERP system, this is also often only realised when it is too late.

Concerns were further raised with regards to the technical skills of users and their feelings of inadequacy with operating the ERP system. The ERP system user base consists of 35 people with an average technical skills level estimated at five and lower out of ten (with ten equal to “highly skilled”). However, the ICT Director argued that the problem does not lie with the users’ capacity to be trained to perform the technical tasks, but rather with the limitation of the software in allowing users creativity to use the system

to perform the tasks. In other words, the software is perceived to be dated, unintuitive and does not require staff members to think about what they are doing and empower themselves technically.

Furthermore, the organisation requires users to be regularly trained. Both new and current users are therefore exposed to and encouraged to train on all the software used in the organisation. The vendor of the ERP system confirmed that the organisation is progressive in training their employees to use the ERP system. However, the vendor believed that the knowledge of new system enhancements is not incorporated into organisational practices and might be a possible reason for their problems.

Many of these issues are corroborated by data obtained through interviews with participants from the various subunits. The Financial Director criticised the ERP system for not being easy or quick enough to use. Moreover, he felt that the system is dated and that there needs to be assessment of how much time people spend getting the relevant data they need from the ERP system.

The extent to which the ERP system depends on human participation was raised as a factor by the Financial Manager. In this regard, she perceived cessation or absence of employees to be the highest risk in her department: "Because there is such a large extent of manual intervention in the [ERP] system, if a person is sick or resigns, the [ERP] system falls apart". The Quality Assurance Manager agreed with this finding. According to her, quality control processes are very dependant on the tacit knowledge of specific employees in her department. Employee absence or cessation often means that quality control processes are delayed or cannot take place at all. In her opinion, it is not the system facilitating these processes which are to blame, but it is "the human factor which is the problem and you will never be able to get rid of that".

Inaccurate data as a result of human error is also one of the biggest concerns the Wine Operations Director corroborated. He stated that mistakes are often made when manually inputting data into the ERP system: "Calculation mistakes or other mistakes made by users using their hands may cause an over or under supply of dry goods being ordered". As a result, production cannot be completed: The oversupply of stock causes a cash flow risk and influences the whole cost structure of the organisation.

The Cellar Master added that human errors are often made by wine makers in the wine cellar when manually working with data. To improve this, he suggested data be presented in a more visual format: "If the [ERP] system were of a more visual nature, it would improve capturing of information". Winemakers, working under him in the wine cellar, also often complain that the ERP system requires them to complete too many tasks and administrative procedures, not leaving them with sufficient time to focus on making wine. Hence, the Cellar Master would prefer the ERP system to simplify these tasks and reduce the amount of administrative paperwork that accompanies it.

Furthermore, the Sales Director noted that the current ERP system is too cumbersome and does not meet the information needs of his staff. He explained that IT personnel are often needed to draw information and conduct analysis on behalf of him and his staff. In his opinion, he wanted “a system where everyone feels confident that the information is correct and [can] use it to the same degree in a way that everyone understands”.

The Data Analyst agreed that the ERP system ought to be easily understandable to its users. He further confirmed that the organisation’s human resources will be a limitation in the selection of a new system: “For instance, we have ten users here at the moment, so we can’t have a system that needs thirty people to operate it after implementation”. The ICT Director suggested that the ERP system needs to be more user-friendly when it comes to data input: “We know what information we want, so it should be very easy for the user to enter it”.

Based on what he has observed, the ICT Director inferred that the technical skills level of employees might be an inhibiting factor in the organisation and needs to be considered when selecting a new ERP system. In his opinion, users have the capacity to be trained to complete sophisticated technical tasks, but that the ERP system does not require of them to do so: “I must state that my perception is not that staff do not have the intellectual capacity to be up-skilled, only that the software environment does not require this understanding”. He therefore emphasised the importance of decreasing the negative perceptions users have of the current ERP system by addressing their fears and inadequacies as part of the selection process.

In addition to this, the CEO suggested that the ERP system should facilitate quick access to information and should allow users to make fast decisions based on this information. He summarised the views of many of the employees on this matter: “The right people in the right places should have the right information, then only will we have a much happier business environment and will the [ERP] system be a success”.

4.4.2 User-related factors identified through observations

The analysis of observation data largely confirms the factors identified above. Users from the different functional units stated that they find the ERP system exceptionally user-unfriendly when it comes to filtering product codes and dealing with access rights of users to remove suppliers, customers, wine brand classes and vintages. In particular, users in the Inventory Systems Control functional unit agreed that many functionalities were removed from the ERP system, because they found them too cumbersome to use. Secondary Wine-making employees added that they need quick and fast access to information and the ERP system should empower users to find information on their own. Primary Wine-making further raised the fact that as a result of the organisation’s significant reliance on human involvement, employees should be willing to complete additional work if the new ERP

system requires that of them.

4.4.3 User-related factors identified through interviews with external experts

The external experts interviewed agreed that users should easily be able to figure the ERP system out by themselves. Two of the experts placed a high value on human intervention through involving users in the development and customisation of their ERP system products. One of them in particular emphasised working with winemakers to make the system more suitable to their needs: “The gap we initially anticipated [in the ERP system market] and one that we still see worldwide today, is that there is an actual desire on the part of winemakers to be able to manage the [ERP] system themselves”. At the same time the external experts also confirmed the importance of getting users to buy into the selection of a new ERP system and training them to use it.

4.4.4 Section summary

The aim of this section is to identify and discuss selection factors related to the users of the ERP system. Data suggest that users would prefer an ERP system that is more user-friendly: easy, quick, simple to use, with a visual format and a system that empowers them to find the data they need themselves. Moreover, the ERP system depends too much on user participation to function properly and this poses problems when employees are absent or leave their positions. In the same way, data inaccuracies often result from manual data input and these are replicated down the production process, negatively affecting decisions and production planning. Lastly, the technical skills level of users and training them to use the ERP system were regarded as important factors for selection. The following section presents and discusses wine industry-related factors identified.

4.5 Industry-related factors

4.5.1 Industry-related factors identified through interviews

Table 4.4: Summary of industry-related factors

SUBUNIT	FACTOR
Middle Management	Exports: Fluctuating exchange rates Industry standards: External quality control Information: Cellar Master and Wine makers need information on the grapes immediately

Table 4.4: Summary of industry-related factors

SUBUNIT	FACTOR
	Environment: Changing weather conditions influence harvest
Technical	Forecasting Industry standards: Statutory requirements Environment: Competitive globalised industry
Top-level Management	Environment: Competitive globalised industry; changing weather conditions influence harvest Product: Complex, combination of perishable and non-perishable goods; has a finite life span Traceability: Products Forecasting

Participants also identified a host of selection factors based on the industry the organisation operates in. The first of these were requirements placed on the ERP system to comply with export regulations. The Pinotage Wine Company currently exports almost 80% of its produce to foreign countries, mainly located in Europe. Not only does this significantly affect the way the supply chain is run, but also the manner in which products are produced. Exporting countries impose strict quality and other regulations which imported products must adhere to. If products fail to do so, these are de-registered from a list of importable products and once a product has been taken off, it is very difficult, if not impossible, for it to be reinstated.

Apart from compliance with export standards, the ERP system also has to adhere to standards regarding the wine industry. Wine industry standards are regulated by a non-profit institutional body called South African Wine Industry Information & Systems (SAWIS) controlled and directed by the South African Wine industry (South African Wine Industry Information & Systems, 2011). These standards regulate the entire wine-making process, from the time the vineyards are planted until the wine is produced and bottled. One such example is the Integrated Production of Wine (IPW) standard. IPW guidelines lay out strict rules and regulations with regards to: the quality of the grapes used; energy use and carbon emissions; use and maintenance of infrastructure and equipment; sulphur dioxide (SO₂); substances added to wine; gases used in wine cooling; management of waste water; management of solid water; disinfectants and cleaning agents; ambient noise levels; packaging materials; bottling, and IPW user training (ARC Infruitec-, Nietvoorbij & Enviroscentific, 2009, p. 2-6).

The organisation is also susceptible to influences from a range of industry variables. The organisation expects its ERP system to assist it in dealing with these to a greater or

lesser extent. One such variable is the competitive globalised wine market environment of which it is a part. As a small wine producer, the organisation needs to have information readily available to be able to make quick decisions and plan ahead if it wants to be competitive. Another variable is the natural environment. Changes in weather conditions can have a significant effect on the harvest and influence the quality of particular cultivars. The organisation therefore has to be able to forecast what it expects the market conditions to be so that the winemaker can plant and procure grapes accordingly.

All three factors mentioned thus far require the ERP system to be able to perform certain technical functions. In addition to enforcing production processes to comply with export and industry standards, users also expect the ERP system to allow them to trace wine throughout its production cycle. Moreover, users explicitly expressed the need to be able to trace grapes from the particular vineyard block from which they were harvested, through the wine-making process up until they are bottled to be stored or distributed. Every chemical and additive added to the grape juice to turn it into wine also needs to be traced back to the source whence it came. Equally important is the ability to perform complicated sales forecasting and planning. It can take up to five years for vineyards to deliver their first harvest and certain wines, red wines in particular, need to be stored for a set period of time before they can be exported. Therefore the ERP system needs to allow users to forecast what future market conditions might be and match this to production.

The Cellar Master was the first of the Middle Managers to acknowledge the importance of industry variables. He argued that the region has, over the last number of years, experienced consistent higher temperatures during summer and less rainfall in winter and that this has had a significant impact on the grape harvest. Consequently, the organisation's vision (and the system to operationalise this) needs to be adaptable to these changes in weather conditions.

The Sales Director emphasised the importance of forecasting for his department. The sales team is responsible for compiling forecasts three years in advance, based on past sales data. This is then given to the winemakers who have to procure from their supply base. For the Sales Director, his biggest risk is not achieving the right volume objectives every year: "If, for whatever reason, the sales team has not done its job accurately, it can have huge ramifications for the business with either a huge over supply or under supply of stock. This has happened in the past".

Participants from the Technical subunit verified the importance of forecasting functionalities for the industry. The ICT Director, in particular, stressed the need for this: "It is non-negotiable that the new system would have a fully functional and fluid forecasting system". The organisation is currently using Microsoft Excel spreadsheet software to perform their "what-if" scenario planning and forecasting, as well as Cognos for added business intelligence functionalities.

The CEO also confirmed the need for forecasting and traceability functionalities. According to him, the Pinotage Wine Company finds itself in a very competitive industry, necessitating the organisation (and its information system) to be flexible and fast-moving. To him this means managing a complex product (consisting of perishable and dry goods) against forecasts by being able to access information quickly. At the same time, he argued that “one needs to be able to assess where ones product is at any given time to potentially minimise any issues”.

4.5.2 Industry-related factors identified through observations

Data from observations verify the importance of the ERP system complying with industry standards and the need for a traceability functionality. With regards to the prior, compliance with ISO, SAWIS, IPW and South African Customs standards were specifically mentioned. In addition to this, it was also noted that these requirements can vary depending on the country being exported to. This increases the need for the ERP system to allow users to trace products across the production and supply chains and identify products which do not conform to specified standards. In addition, different foreign markets have their different requirements, which makes traceability of products produced for specific markets even more important.

4.5.3 Industry-related factors identified through interviews with external experts

External experts further corroborate the data findings of the interviews and observations. One of the vendors interviewed asserted that the process of wine-making is not “recipe-oriented”, but has a subjective and creative side to it: “You do not simply manage a production house. You have a creative person who has to operate in a specific environment where you do not merely just produce”. He further explained that the wine produced is influenced by a number of different variables from the industry environment, adding to the complexity of the production process. The technical system used to manage these processes therefore has an important part to play: “The wine system has to equip you to make decisions easily and [has to] contain information on how circumstances have changed in your environment”. Another expert corroborated this and stated that the ERP system has to be flexible enough to accommodate changes in production: “You have to make your [ERP] system extremely flexible from a processing point of view [so as] not to impose restrictions on these guys [winemakers], as they can decide to do something else on the spur of the moment”.

Another expert emphasised that wine farms differ from other farms with regards to two aspects. Firstly, the price received for the product (grapes) is entirely linked to the

final product produced (wine), and secondly, the time to harvest is on average five years (as opposed to two years for most other agricultural industries). This in turn significantly influences how decision-making is conducted in these organisations and confirms the need for accurate forecasting earlier expressed: “One of the biggest challenges in the wine industry is your whole sales forecasting and planning and very few [ERP] systems can drive these processes”.

Equally important is the fact that wine farms tend to manage their vineyards per block (of cultivar) and not per crop planted, as is the custom in other agricultural industries. According to the same expert, this is done on account of the influence grape quality has on the wine produced: “The product you cultivate on the farm will determine the quality of the product produced”. For this reason wine producers and wine farms place significant emphasis on traceability throughout the whole wine production process. Apart from being able to perform sophisticated traceability and forecasting functionalities, most external experts agreed that if an ERP system is to be used by an organisation in the wine industry, it has to be able to perform adequate quality control, cost and stock management functionalities.

4.5.4 Section summary

The aim of this section is to demonstrate that industry demands necessitate the inclusion of certain industry-specific factors as part of ERP system selection. Data revealed that four factors in particular were considered to be very important. Users expect the ERP system to: Comply with and enforce export and wine industry standards; assist the organisation in dealing with environmental variables, such as increased global competitiveness in the industry and adjustments to business strategy brought about by changes in weather patterns, and encompass specific technical functionalities, in particular traceability and forecasting. The next subsection focuses on factors related to the vendor of the ERP system.

4.6 Vendor-related factors

4.6.1 Vendor-related factors identified through interviews

Table 4.5: Summary of vendor-related factors

SUBUNIT	FACTOR
Financial	Internal: vendor remained behind rest of market; focus and management are different; has to stay up to date with industry trends
Technical	Industry experience Relationship: Vendor should want to be associated with the organisation's brand Customisation: Vendor does not prefer their interfering with the system Support from vendor has to be strong

The last major theme identified from data analysis concerns factors related to the vendor(s) of ERP systems software. In general, the data suggest that the relationship between the client organisation and the vendor is of the utmost importance. The organisation studied, like many other SMEs in the wine industry, has limited in-house IT capabilities and relies to a large extent on the vendor to assist it with ERP system implementation and maintenance. In addition, vendors are also regularly consulted to assist with other IT-related and technical decisions.

The client-vendor relationship in the organisation studied is a good example. As the organisation grew with time, its IT requirements changed. Hence, the organisation approached the vendor with requests for changes to the ERP system, but these either did not suit their needs or were not delivered in time. Accordingly, the organisation decided to solve the problem themselves and proceeded to customise the ERP system and employ supplementary software where additional functionalities were needed. This led to the organisation's relying less and less on the vendor for assistance and as a result, the SLA with the vendor was compromised.

Data further suggest that vendors have to remain up to date with developments in the ERP system market. Moreover, ERP system vendors should have industry experience, and their ERP system products have to be encompassing of industry best practices and offer basic industry-required functionalities. As previously mentioned, the problem with this lies in the fact that the number of ERP system vendors providing in the needs of the wine industry is significantly small, and they cannot necessarily contend with bigger market leaders when it comes to research and development. These bigger market leaders also do not provide ERP systems specifically aimed at the needs of the wine industry and their products are too expensive for SMEs to afford. Given this problematic situation, it is understandable why organisations, like the one studied, would choose customisation as a viable alternative.

According to the Financial Manager, the vendor of the current ERP system has not remained up to date with developments in the rest of the ERP system market. In her opinion, the vendor does not know what functionalities an organisation in the wine industry requires to survive in a globalised industry: “The vendor has to remain up to date with cost management, forecasting and “what-if” scenario analyses, because these are the type of things [functionalities] which influence the bottom line”. She added that the fit between the current ERP system and the organisation might not be as relevant as ten years ago when it started.

The Cost and Systems Manager confirmed that support from the vendor is important. He stated that the organisation had approached the vendor with requests for changes, but that these were mostly not delivered in time: “That is why we went left field with the ERP system, because we got frustrated. We talked to the vendor time and time again and eventually got fed up, so we made the changes in Cognos ourselves, because the vendor could not do it”. The Data Analyst agreed that he experiences problems when asking technical questions and sending requests for changes to the vendor. He explained it as follows: “Sometimes it takes months [to respond to change requests]; sometimes it is a quick and feeble response and a lack of understanding of the question. Sometimes, if I am lucky, the solution comes through fast and I am satisfied”. He added that he would like to see the ERP system become more customisable, but the vendor does not prefer them to interrogate the database on the operational side, as this interferes with the ERP system while it is operating.

The ICT Director indicated that industry experience is an important consideration by operational managers in the organisation. He, however, did not agree with the operational managers. To him, it was more important that the vendor is good at managing the implementation process and employs users of the ERP system to make a success of the system. In other words, he does not want a vendor with a “know-it-all mentality”. Nonetheless, to obtain user buy-in from his managers and make them believe the project will succeed, it was decided that a vendor without industry experience was not to be considered as part of the selection process. The ICT Director further agreed with the Cost and Business Systems Manager that support from the vendor is arguably the most important consideration: “We are really looking for a vendor who is looking for an annuity income and a partnership and [to be] associated with our brand”.

4.6.2 Vendor-related factors identified through observations

The analysis of observation data corroborates the need for a strong client-vendor relationship. Participants from the various functional units agreed that a lack of support by the current vendor for configuration and training for systems improvement is a pressing concern. In addition, it was mentioned that the organisation also does not have a good

relationship with the vendor of their materials requirement planning system and that this might be the cause of their not having explored the full functionalities of the particular software.

4.6.3 Vendor-related factors identified through interviews with external experts

Many of the factors mentioned are further verified through data analysed from interviews with external experts. One of the experts explained that many SME wineries have no IT personnel to assist them with the ERP system and other IT-related decisions: “I have, for example, clients where I am called in to take simple network decisions, even though that is not our company’s main focus, plainly because they do not have the skills”. Another expert remarked that this fact necessitates these organisations to consider vendor-related factors as an important part of ERP system selection: “Yes, they [the organisations] will definitely look at the vendor and see if the guy knows what he is talking about, in order for them to receive a return on their investment as they are more reliant on us [the vendors], not having the resources themselves”. The experts also listed industry knowledge as an important factor for selection.

4.6.4 Section summary

This section focuses on the selection factors related to the vendor(s) of ERP system. The most important factor to be identified through data analysis was the significance of the vendor-client relationship for the organisation. As part of this, participants expressed the need for the vendor to remain up to date with product developments and to be knowledgeable about industry practices. This was corroborated by data obtained through observations and interviews with external stakeholders, of which many are ERP system vendors themselves.

4.7 Additional selection factors identified

Additional ERP system selection factors identified from data analysis are presented in Appendix E. As with the five themes discussed, these were structured according to the categories defined in chapter 2. The purpose of this is to augment the factors discussed in the sections above and present the reader with a comprehensive set of selection factors considered by an SME in the wine industry of the Western Cape when selecting ERP system.

4.8 Chapter summary

The aim of this chapter is to present the reader with the results of the study conducted. Each of the five major factor themes to emerge from data analysis were discussed in separate sections. In each instance factors identified from participant interview transcripts were first discussed and subsequently verified by data obtained through observations and interviews with external experts. The first and most prominent of these categories were the technical factors discussed in section 4.2. Three factors in total were identified: limited/missing functionalities, integration and flexibility. Section 4.3 augmented this list by adding selection factors related to the organisation. In this instance, four factors were noted: organisational policy for software use; organisational policy for communication; the importance of BPR, and the importance of SLAs. Thirdly, three user-related factors were identified and discussed in section 4.4. These include: user-friendliness, the extent to which the ERP system depends on human participation and technical skills of users. Section 4.5 was the fourth category to emerge from data analysis and discussed factors related to the industry the organisation selecting the ERP system operates in. All together, three factors were singled out: compliance and enforcement of export and wine industry standards; the extent to which the ERP system assists the organisation to deal with industry-environmental variables, and the need for certain functionalities, given these requirements. Lastly, section 4.6 summarised factors related to ERP system vendors. In this regard, it was noted that a strong vendor-client relationship should be a serious consideration for SMEs in the wine industry when selecting an ERP system. The chapter concluded with an exhaustive list of other, less prominent, but nonetheless important factors identified during data analysis. Meaningful implications and conclusions from the data are drawn in the next chapter.

Chapter 5

Conclusion

5.1 Introduction

As discussed in chapter 1, SMEs differ from larger enterprises in important size-determined ways, which may affect their selection of ERP systems. Furthermore, SMEs were said to have unique computing needs determined by the industry they operate in. As a result, SMEs experience problems when selecting ERP systems. The purpose of this study is to define and describe the size-specific and industry-specific factors which influence ERP system selection by an SMEs in the wine industry of the Western Cape.

To fulfil this purpose, ERP system selection literature was first reviewed and critically analysed. The main results were summarised at the end of chapter 2 in the form of 18 broad categories of ERP system selection factors. Subsequently, a case study was conducted on a wine-producing SME in the Western Cape in the process of selecting a new ERP system. Data were collected by means of interviews, observations and documents, and consequently analysed using the methods of coding, pattern coding and memoing as explained in chapter 3. The findings of the study were presented and discussed in chapter 4 along five major themes to emerge from analysis of the data: technical, organisational, user-related, industry-related and vendor-related. In total, 14 selection factors were identified.

Against this background, it is now the purpose of this chapter to make a meaningful final interpretation and draw conclusions based on the factors identified (Bui, 2009, p. 192). For this purpose, the researcher utilised skills of interpretation and reflection to demonstrate not only what has been learnt from the findings of the study, but also what has been learnt during the research process (Bui, 2009, p. 192). The chapter is outlined as follows: Firstly, the main findings of chapter 4 are summarised and discussed in section 5.2. Secondly, these are compared to existing selection factors in the literature in section 5.3. Thirdly, based on these findings, size-specific factor suggestions for SMEs are presented in section 5.4. Similarly, industry-specific factor suggestions for wine

practitioners are recommended in section 5.5. Following this, a synthesis of the findings towards a theoretical model for ERP systems software is suggested in section 5.6. Next, in section 5.7, the impact of the limitations and weaknesses on the findings of the study are acknowledged and discussed. Against this background, recommendations are made for future research in section 5.8. Lastly, in section 5.9, the main conclusions drawn and lessons learnt from this study are used to answer the primary and secondary research questions posed in chapter 1.

5.2 Summary and discussion of main findings

The purpose of this section is to summarise and further discuss the major findings identified in chapter 4 (Bui, 2009, p. 194). Accordingly, subsection 5.2.1 summarises the problem situation at the Pinotage Wine Company in the form of a Soft Systems Methodology (SSM) rich picture. Following this, the main findings of the study are presented and discussed in subsection 5.2.2.

5.2.1 Summary of problem situation

SSM was developed by Peter Checkland (1998, p. 157) and is based on the assumption that “social reality in human groups is continuously socially created” and can therefore not be regarded to be “absolute but will change through time”. The aim of research conducted by means of this model is to “seek interpretation and learning rather than optimisation” (Checkland & Holwell, 1998, p. 158). The methodology concerns itself with “ill-structured problem situations” which contain human beings who take “purposeful action” to mitigate the problems experienced (Checkland & Holwell, 1998, p. 157-158). SSM, and its related models, enables researchers working within the interpretivist paradigm to explore certain real-world situations and structure the social debate flowing out from this:

As such they [models] can be used both to explore the real-world situation and to make that questioning an explicit process which is in principle recoverable by anyone interested enough to follow the process and see how it led to the conclusions reached (Checkland & Holwell, 1998, p. 159-160).

An important part of SSM constitutes the use of rich pictures (Checkland & Holwell, 1998, p. 161). This technique is preferred above linear prose as it enables “both instrumental and cultural relationships to be captured” (Checkland & Holwell, 1998, p. 161). According to Avison & Fitzgerald (2006, p. 199), a rich picture is a “pictorial caricature of an organisation and helps to explain what the organisation is ‘about’”. The aim of the

technique is to record the structure¹, process² and climate³ of the problem situation (Checkland, 1985, p. 824). The choice is left to the researcher to devise special symbols and an associated key, or to include text as part of this representation (Horan, 2000, p. 258). The process of completing a rich picture can assist the researcher to visualise and discuss the role of people in the organisation, define “aspects of the organisation which are intended to be covered by the information system”, and make clear the “worries of individuals, potential conflicts and political issues” (Avison & Fitzgerald, 2006, p. 200-201).

Figure 5.1 summarises the ERP system problem situation at the Pinotage Wine Company. The different elements of structure in this regard are the four identified subunits, the organisational and external IS, as well as other stakeholders (ERP system vendor and external experts). The arrows between the different structures indicate the flow of the processes in the organisation and the relation between the different structural elements. The climate is indicated by the nature of the relations between them (conflicting or non-conflicting relationships), as well as the main concerns (overlapping or contradictory) of each participant captured in the speech bubbles.

5.2.2 Discussion of main findings

Since the implementation of the ERP system more than ten years ago, the organisation has grown and changed its vision and business strategy. Consequently, this has led to a change in the role the ERP system is expected to perform in the organisation. The organisation approached the vendor to assist it in adjusting the ERP system to achieve this. However, the late and inadequate changes provided by the vendor prompted the organisation to customise the ERP system itself to fill the shortcomings in functionalities needed. Additional software was introduced and manual inter-departmental solutions developed to supplement the ERP system where customisation did not prove effective enough. As the organisation continued to solve its problems in-house, it fell behind in bi-annually updating the ERP system, compromising the SLA with the vendor and leading to a rift in the client-vendor relationship.

Problems started to surface as time passed. Many of these were a direct result of the customisation of the ERP system: ERP system became dated; it did not integrate well with the additional software used or IS of external stakeholders; data inconsistencies were noticed, and users became frustrated with the fact that they could not use the ERP system to make important decisions. Subsequently, a process to select a new ERP system was instigated by the ICT Director. During this process, participants from the

¹This includes “static elements such as organisation and reporting structures” (Checkland, 1985, p. 824).

²That which is happening “either through, via or in spite of structures” (Checkland, 1985, p. 824).

³Relation between structure and process.

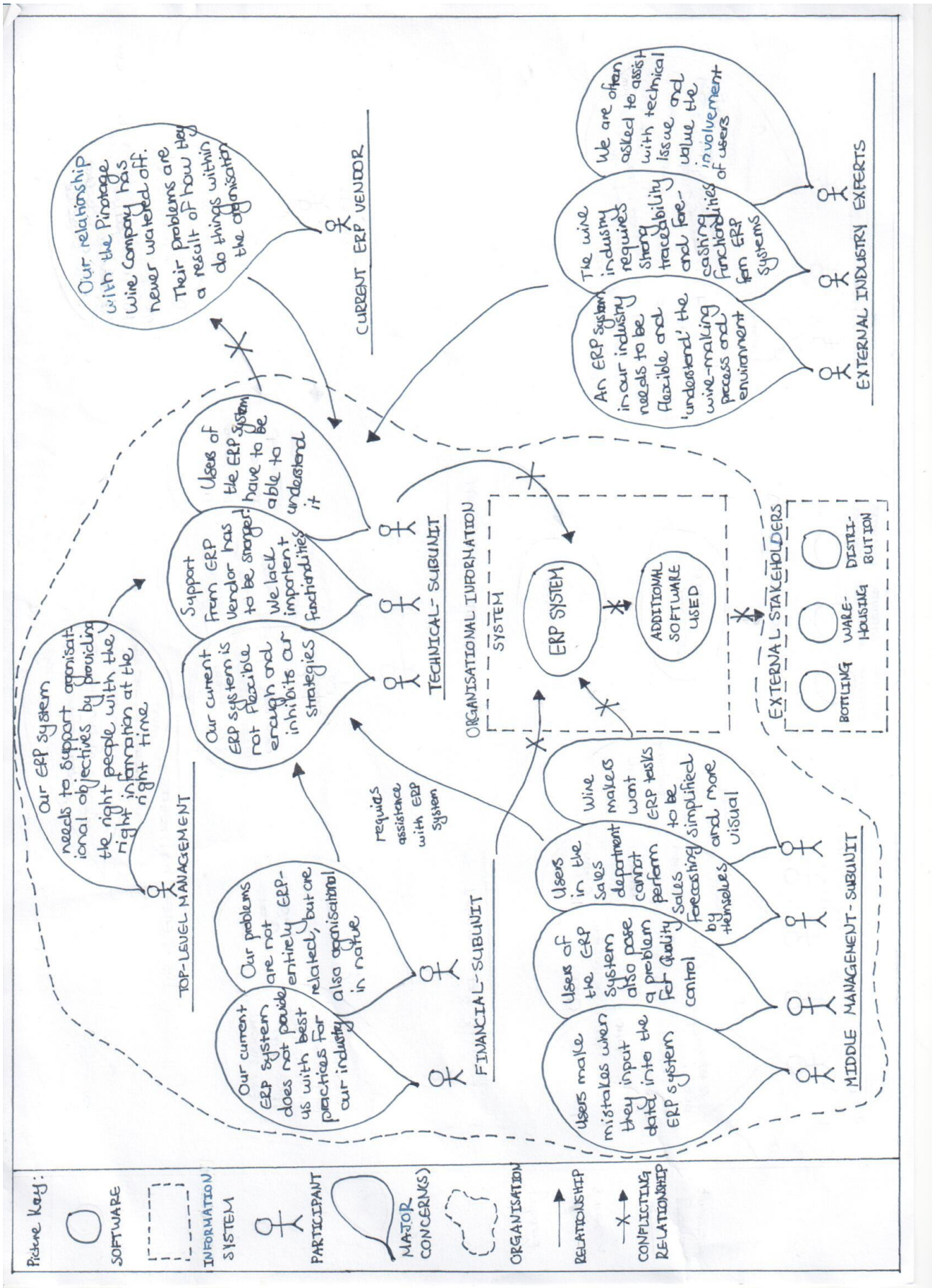


Figure 5.1: Rich picture of the ERP problem situation at Pinotage Wine Company

four subunits raised a number of issues and identified a host of factors they perceived to be important when selecting the new ERP system. In total, 14 selection factors were identified, with some subunits placing more emphasis on particular factors than others. These are presented in table 5.1.

Table 5.1: Summary of predominant selection factors identified

CATEGORY	FACTOR
Technical:	Limited/missing functionalities Integration with software and other internal/external systems Flexibility
Organisational:	Policy standard needed for software use and decision-making reporting Policy standard needed for communications and information standards in the organisation Importance of business process re-engineering (BPR) to integrate business processes Importance of adequate SLAs to address third party issues
User-related:	User-friendly: meet users' information needs and empower them to find information by themselves Evaluate extent to which ERP system depends on human participation Technical skills of users: ERP system should empower users
Industry-related:	Compliance and enforcement of standards required to export produce Compliance and enforcement of standards required to produce wine Assist the organisation in dealing with external environmental variables: Changes in weather conditions, remaining competitive Need for certain industry-required functionalities: Forecasting and traceability
Vendor-related:	A strong vendor-client relationship is very important Vendor has to stay up to date with product developments and offer needed functionalities Vendor needs to understand the industry

5.2.2.1 Integration with software and other internal/external information systems

The small size of the organisation implies that it does not have the necessary capacity or resources to complete all of the wine production processes itself. Consequently, the organisation is forced to rely on external stakeholders to assist with bottling the wine, storing it in warehouses (to be exported), and handling the distribution of their products (for the local market). For this to take place, the organisation needs to share its product information with its external stakeholders. Hence, the ERP system is expected to facilitate electronic interchange of data between the organisation and its external stakeholders by fully integrating with the different external business systems used by these stakeholders. Where the ERP system is not able to do this adequately, it leads to inconsistencies and time delays in data which affected the entire production process.

Furthermore, the ERP system is expected to be integrateable/compatible with other internal software/business systems. The organisation studied is too small to afford an expensive, all-in-one ERP system that has built-in functionalities to provide for unique requirements. As previously indicated, the options on the ERP system market for smaller organisations in the wine industry are few in number and relatively limited in the functionalities they can perform. Hence the organisation studied makes use of additional software/business systems to be meet its requirements. Therefore it is important that the ERP system is able to fully integrate with these software programmes and facilitate electronic data interchange just as it is required to do with the external business systems of external stakeholders. This may reduce the need for data to be handled manually outside the ERP system and decrease the risks associated with inconsistent and time-delayed data.

5.2.2.2 Flexibility

From the study, it is evident that the organisation does not have the necessary human resources required to fully operate the ERP system. In many instances, the organisation only has a single person per department in charge of completing certain production processes, and one individual is often required to complete the work of several people. In this context, absence or employee cessation implies that there are no other people who know how to perform specific tasks the ERP system requires before it can proceed to subsequent production processes. In this regard, the ERP system is expected to be more flexible and allow users to continue certain processes even if previous ones have not yet been fully completed. If this is the case, users may be able to overwrite access rights for certain processes in order to complete the tasks of an individual who is absent.

The ERP system is further expected to be flexible enough to accommodate the unique needs of winemakers. As explained in chapter 4, the process of making wine is a creative

and subjective endeavour, influenced to a large extent by complex decisions of the wine-maker him/herself and does not always conform to a linear process. For this reason, the making of wine cannot be compared to other production facilities. Wine producers often have contracts with wine farms and other cellars to procure specific grape cultivars and additional grape juice, which they then combine to produce a certain variant of wine. And depending on the harvest yield, grapes are generally limited in supply. Thus, once used, wine producers cannot decide to order more grapes to increase their production of wine. In addition, the quality of the grapes/grape juice is significantly influenced by the weather conditions and soil quality (*terroir*) of the area they are harvested from. Hence, winemakers do not always know what the quality of the wine they produce will be in a particular year, until they have received the grapes and have already begun the process of making the wine. For this reason, the WIS software or ERP system a wine producer chooses has to allow the winemaker to factor in the above variables and allow an amount of flexibility in the process by not imposing too many restrictions.

5.2.2.3 Policy standards needed in the organisation

The organisation studied has no formal policy in place that dictates which software employees are to use when reporting for decision-making purposes or completing other tasks in their respective departments. This lack of a policy concerning software use can explain, to an extent, why the organisation does not view its ERP system as imperative to realising business strategy and achieving operational goals. This can possibly be the reason for the different perceptions employees have about the role of the ERP system in their departments and how it can be used to support their business goals. The lack of such a policy might also explain why the organisation did not first conduct a thorough investigation of the functionalities the ERP system had to offer before deciding to customise it and employ additional software.

In addition to a policy on software use, it was further evident that the organisation also needs to assess the quality of internal and external communications. Employees need to be informed of what is expected of them and how their work relates to that of others in the organisation. Different departments need to know where their responsibilities begin and end. External stakeholders must be informed of important organisational decisions concerning them. Moreover, a communication and information policy is needed to determine how the new ERP system can improve communications and the standardisation of information in the organisation by assessing the manner in which it facilitates collaboration between employees and standardises the use of information inside and outside the organisation. This may help to ensure that any decisions taken regarding the selection of a new ERP system are properly communicated to all stakeholders involved, increasing the fit of the ERP system to organisational processes.

5.2.2.4 Importance of BPR as part of selection

Many participants indicate that they would like to see the ERP system support the organisational processes of their departments, as this is not the case at present. As previously noted, the organisation studied has undergone significant structural changes in the past number of years and many of its organisational processes have not been properly defined yet. Data obtained from external stakeholders indicate that this seems to be the case with SMEs in the wine industry more often than not. Before an ERP system can support organisational processes, the processes need to be re-designed and integrated in line with the “best practices” of the proposed ERP system. Making the selection of the ERP system as much of an organisational issue as it is a technical one. Therefore, the organisation needs to consider the importance of business process re-engineering as part of selecting new ERP system. This includes performing a proper gap analysis to determine the 20% of requirements which distinguish it from other organisations and what ERP system would best support these.

5.2.2.5 Importance of adequate SLAs

As indicated previously, the size of the organisation forces it to rely on third party stakeholders to be able to complete various production processes. This is facilitated through the integration of its ERP system with the external systems used by the stakeholders where possible. However, integration does not guarantee that these processes are completed in time or that the processes are completed to a satisfactory standard. Matters such as these are usually addressed in the SLAs between the organisation and its third party stakeholders. As part of selecting a new ERP system, it is important that the organisation determines which rules and regulations it wants the ERP system to impose on the stakeholders and where it cannot meet these requirements, it should make sure to address them in the relevant SLAs.

5.2.2.6 User-friendliness

Many participants are of the opinion that the current ERP system is not user-friendly or easy enough to use. Moreover, they feel that the ERP system does not meet their information needs as it is difficult and time-consuming to find the data they needed to make decisions. As a result, the help of IT experts is often needed to assist them in performing these tasks. However, the organisation studied, like other SMEs, is limited in the number of in-house IT expertise it has at its disposal. Subsequently, users have developed their own ways of completing these tasks using additional software. This increases the risk of having multiple versions of the same data which do not correspond to the data in the ERP system. For this reason, the organisation should consider determining the extent of

user-friendliness they want the new ERP system to exhibit.

The ERP system also needs to meet in the information needs of the winemaker. From a wine-making point of view, the current ERP system is perceived to be too complicated and requires too many administrative tasks to be completed, not leaving the winemakers with enough time to focus on the making of wine. The result is that the administrative tasks were left to the last minute to complete, causing delays in production processes in other parts of the organisation. Winemakers require the ERP system to simplify these processes by reducing the amount of manual administrative work that accompanies each task and by presenting information in a visual format.

As explained previously, there are a number of factors that play a role during the process of making wine. The winemaker thus also requires the ERP system to capture as much of the information as possible during the course of the process so that he/she has detailed data to make decisions from. Therefore, in addition to testing the level of user-friendliness in the organisation, small wine producers need to assess the level of user satisfaction the cellar master and winemakers require when selecting an ERP system. As explained in chapter 4, some vendors have come to realise the importance of these factors and have opted to include inputs from winemakers in the development of their software.

5.2.2.7 Extent to which the ERP system depends on human intervention

As indicated by the data presented in chapter 4, the ERP system in the organisation relies to a large extent on human participation. Data have to be manually re-consolidated on a regular basis between the ERP system and other software/IS, relying on users to make sure that they have inputted the right data into the system. Hence, when mistakes are made during data input or if employees are absent, the ERP system does not function properly. Participants have further emphasised that some of the production processes (for example quality control) are inherently dependent on human participation and no ERP system will change this. For these reasons, it is important that the organisation determines to what extent the new ERP system will rely on human participation by looking at how many users are needed to adequately operate the system at any given time.

5.2.2.8 Empowering users

As mentioned in chapter 4, the organisation is limited in the number of employees it has to its disposal to manage and operate the ERP system. In particular, the number of IT-skilled personnel is limited. Data also suggest that the average technical skills level of employees is not very high. For these reasons, the organisation requires users to be able to easily understand the system, operate it and find the data they need themselves. In other words, the ERP system should be intuitive in the way it operates and allow

even non-technical users to manipulate it (to an extent) to suit their needs. Moreover, it should force users to think why they are performing certain tasks and by means of this, assist them in learning how the software operates. As noted, the training of users does not seem to be a problem in this regard; it is more a case of the current ERP system not requiring users to think about what they were doing and thus not empowering them to solve their technical problems themselves.

5.2.2.9 Compliance and enforcement of export and industry standards

In addition to complying with the legal and tax regulations of a country, ERP system is further expected to comply with and enforce export and industry standards for wine production. As explained in chapter 4, the organisation studied exports the majority of their produce to foreign markets. In order for them to be able to do so, their products have to comply with very strict local and international export standards. To complicate matters, different foreign countries have different regulations and quality standards for importing wines. In order to comply with these standards, wine producers also have to ensure that their product meets local industry standards for wine production.

In effect, this means that even before the grapes/grape juice reach the wine cellar, certain procedures should already have taken place to ensure quality compliance. Information related to this needs to be captured as it is needed further down the production process for the wine producer to be able to determine whether a given product conforms to industry and exports standards or needs to be scheduled for reworks. The ERP system needs to subscribe to these standards and ensure that they are enforced from the moment grapes are planted until the wine reaches consumers in foreign markets.

5.2.2.10 Assistance in dealing with external environmental variables

Apart from impacting on the quality of wine produced, external variables also exert a significant influence on the business strategy and therefore the products a wine producer chooses to produce. As explained in chapter 4, changes in weather conditions can have a significant impact on the quality and yield of the grape harvest in a particular year and wine producers need to be able to adapt quickly to this by adjusting their production forecasts. In addition, wine producers in the Western Cape find themselves not only competing against neighbouring wine producers, but also against competitive foreign producers in the international market. Therefore it is imperative that these organisations are able to adapt to local and international market demands by changing their strategy as needed. Given the significant impact an ERP system has on the strategy of an organisation, wine producers need to determine if the software will allow them to change their production forecasts and adapt their strategy quickly enough to deal with the impacts of the external industry variables mentioned.

5.2.2.11 Missing/limited industry-required functionalities

The participants expressed the need for the ERP system to be able to adequately perform certain sophisticated functionalities of significant importance for the wine industry. These functionalities include sales forecasting and planning, traceability of products, quality control, and cost and stock management. As explained in chapter 4, the current ERP system either does not have the ability to perform these functionalities, or does so inadequately. For example, quality control cannot be done using the ERP system and traceability of products is only possible up to a point.

However, large ERP systems produced by market leaders either do not perform these functionalities or are too expensive for the organisation to afford. The organisation studied is therefore forced to assess the extent to which ERP system products from smaller, wine-industry oriented vendors, or wine producing software in combination with an ERP system, are able to perform these functionalities. If this is not done to a satisfactory level, the organisation needs to determine what additional software/human processes they will have to implement as supplements to the ERP system.

5.2.2.12 Importance of a strong vendor-client relationship and a vendor who understands the industry

As indicated previously, the organisation studied faces severe human resource constraints, especially with regards to employees with IT skills. This, together with the relatively low level of technical skills in the organisation, necessitated it to turn to the vendor for technical support and training of users. However, the organisation felt that the vendor of the current ERP system did not provide adequate and timely assistance and decided rather to solve their problems in-house. In an effort to avoid the mistakes associated with this decision, they highlight the importance of a strong client-vendor relationship as a significant consideration in selecting a new ERP system. But the organisation cannot afford to purchase an ERP system product from one of the market leaders and pay for the high-quality services these vendors provide; it is limited to choose from a selection of smaller vendors, catering specifically for the industry.

In addition, the local WIS market is relatively small. As mentioned in chapter 3, ERP system market leaders do not currently provide ERP system with modules for wine production. Hence, the market is made up of smaller ERP system vendors who either offer a complete ERP system (including wine production functionalities), or have developed wine-producing software that integrates with an existing ERP system of one of the bigger market vendors. Either way, wine producers rely on these smaller vendors to a great extent to provide them with the latest technologies which can assist them to improve their wine-making efficiency. In order for these vendors to do this, they in turn must understand the different variables at work in the industry, how these impact on the wine-

making process and what users expect of the software. However, given the small size of the wine industry compared to other industries in South Africa, it is anticipated that these vendors do not generate enough income to invest in sufficient research and development as larger ERP system vendors do. For these reasons, wine producers not only have to consider the functionalities of an ERP system on offer, but also need to focus on the potential of the ERP system vendor to provide long-term support for the ERP system.

5.3 Comparison of findings with existing selection factors in the literature

The findings presented in the previous section corroborates many of the findings of previous studies. A comprehensive set of ERP system selection factors identified to be of importance for SMEs were presented in section 2.6 of the literature review in chapter 2. The most important technical, organisational, user-related, vendor-related and industry-related factors are summarised below:

- **Technical:** required infrastructure; module completeness, standardisation of data; language and currency; ease of integration with external systems; ease of in-house development and upgrading; use of newest capabilities of IT; automatic back-up of information; shorter processing times; minimum of errors; maintainability; data conversion; availability of integrated hardware/software package; compatibility with existing hardware/software; availability of source code; customised functionality; flexibility of the software; ERP system product characteristics; functionality of the software; quality of the product; implementation speed and cost; system reliability; compatibility with other systems; ease of customisation; fit with parent/allied organisation systems; implementation time; reliability.
- **Organisational:** strategic fitness of the ERP system to the organisation; organisational processes; changes resulting from module implementation; business processes documented; core strengths and weaknesses identified; fit with current business processes; compatibility with organisational structure.
- **User-related:** user-friendliness; user interfaces required; check level of user-satisfaction; continuous user-participation; opinions of in-house experts; opinions of subordinates, end-users and outside personnel acquaintances.
- **Vendor-related:** supporting and consulting services; implementation ability; financial conditions; ERP system market share; size; research and development; price of products and services; visiting a reference site; performing of quality checks; technical support; user training; technical skills and experience of using products

developed; reputation; business skills; past business experience; opinion of vendor; social networking with potential vendors to foster business relations; clear communication and information exchange between client organisation and vendor.

- **Industry-related:** industry-specific ERP system solution offered; domain knowledge of ERP system suppliers; vendor references (in particular with regards to ERP system projects completed in the same industry); vendor's experience and knowledge of the organisation's area of business; specialised industry knowledge of the vendor.

In addition to these, it was argued in subsection 3.2.3.2 of chapter 3 that SMEs experience difficulties when selecting (ERP system) software as a result of size constraints. In summation, the following points of relevance were emphasised:

- ERP system products should be of a low cost;
- Vendors who develop ERP system solutions for smaller organisations are considered to be scarce;
- Vendors are unwilling or unable to customise ERP systems for the needs of the smaller organisations;
- Difficulty in choosing between bigger and smaller vendors is experienced;
- Difficulty to choose between similar ERP system products on the market is experienced;
- There are expectations that vendors should provide support, particularly with regards to IT strategy, training of users, keeping up to date with IT developments and to using and analysing existing data in a more efficient manner;
- Vendors should have knowledge about the particular industry the SME operates in;
- SMEs do not fully comprehend how ERP systems can benefit their businesses;
- Flexibility, adaptability, short implementation time and a fit with business procedures are considered important selection factors;
- ERP systems need to be localised to reflect social, economic and regulatory contexts;
- ERP systems are expected to be customisable at different levels;
- Business process re-engineering (BPR) ought to be carried out on an incremental level to promote organisational learning;

- SMEs are inclined to customise their ERP systems, develop their own extensions and buy a best-of-breed package;
- IS (if present) are of a less sophisticated nature than those of larger organisations;
- Information-gathering responsibilities are concentrated into one or two individuals;
- Employees in SMEs have fewer resources at their disposal to gather information, and
- SMEs also differ from larger organisations in terms of the quality and quantity of the information they gather.

5.3.1 Findings that corroborate existing selection factors

From the above, it is evident that various findings of the study corroborate ERP system selection factors from the literature. These include: integration of the ERP system with external business systems and its compatibility with existing software in the organisation; flexibility; user-friendliness; strong vendor-client relationship; the need for the vendor to keep up to date with latest developments and technology, and the need for the vendor to have domain-specific knowledge and understand the industry an organisation operates in. Furthermore, study findings also verify many of the constraints experienced by SMEs when selecting (ERP system) software products. These include: There is a limited number of smaller vendors to choose from in the WIS market; the vendor is expected to assist with hardware and other technical decisions in addition to the ERP system; the SME customised its ERP system and developed its own software extensions; the information system is of a less sophisticated nature than that of larger wine producers, affecting information-seeking practices such as the quality of information gathered, and participants in the organisation had fewer resources to their disposal to gather needed information for decision-making.

5.3.2 Findings that contradict existing selection factors

On the other hand, findings also contradict factors in the literature by questioning the level of their significance. The first of these is the high importance placed on the cost of the ERP system in previous studies. Data suggest that this factor is only of secondary importance compared to other selection factors such as available functionalities of the proposed ERP system. The reason for this might be that the organisation is aware of the extent of its resource limitations and is therefore only considering relatively less expensive ERP system from smaller vendors. Secondly, BPR is found to be of more significance than fit with current organisational structures. In this regard it is noted that the organisation

is aware that certain organisational processes need to be changed and integrated before an integrated ERP system can even be considered. A fit of business processes to ERP best practices is therefore proposed.

The importance placed on empowering users as opposed to occasionally training users to use the software, further contradict existing literature. Findings suggest that software should first and foremost be more intuitive and easy for users to understand so that they are able to train and empower themselves where possible. Furthermore, findings indicate that ERP system vendors in the wine industry have already customised their systems to suit the needs of this particular industry. However, the problem in this instance seems to lie with the quality of the customised products and whether they truly encompass best practices for the industry.

The organisation studied also experienced no difficulty in choosing between bigger and smaller vendors. Their financial limitations immediately exclude bigger players from the selection process. Moreover, the bigger vendors do not currently provide ERP system modules aimed at the wine industry sector, thereby further limiting the organisation's choice to smaller vendors. In the same way, the organisation is fully aware of how a new ERP system could benefit it, mainly as a result of having used an ERP system before. Different participants in the organisation do, however, have differing perceptions of what they expect of the new ERP system in their subunits and departments.

5.3.3 Findings that augment existing selection factors

In addition to corroborating and contradicting, findings also augment existing selection factors in the literature. Firstly, the need for organisational policies regarding software use and communication and information is emphasised. Existing selection factors have indicated the need for clear communication during ERP system selection⁴. Al-Mashari et al. (2003, p. 359) in particular emphasise the important role a communication plan and “open information policy” play during ERP system selection to effectively communicate change associated with ERP system selection. Expanding on this, the findings of this study suggest ERP systems also be evaluated based on their potential to foster and operationalise the communication and information policy standards of a particular organisation. In other words, if an organisation values information sharing between employees, to what extent does the proposed ERP system enable them to collaborate and effectively exchange information? Also, in the event that the ERP system is not able to fully integrate with internal software and IS, such a policy can specify the minimum standards and time periods for manual data re-consolidation between the different systems.

Coinciding with this is a policy on software use in the organisation. If an organisation similar to the one studied cannot afford an ERP system that meets its every need, it might

⁴Scott & Vessey (2002, p. 78); Nah et al. (2001, p. 291); Ganapathy & Raju (2008, p. 201).

be necessitated to make use of less expensive additional software in combination with the ERP system. Similar to the communication and information policy, this document can specify which software is to be used for which purposes by employees and in what format reporting for decision-making purposes is to take place.

Findings further suggest that SLAs are important in addressing issues surrounding the ERP system and external stakeholders. If an organisation, for financial reasons, selects an ERP system product which is different from the ones used by its external stakeholders and is not able to fully integrate with these systems, the SLAs needs to specify how manual data re-consolidation is to take place. An example of this in the study is the use of different production codes between the organisation studied and its external stakeholders. Because the organisation's ERP system is not able to integrate fully, data have to be manually re-consolidated from time to time. This often results in production time delays, which can be avoided if it is adequately addressed in the SLAs as part of ERP system selection.

Furthermore, the extent to which the ERP system depends on human participation and its empowering of users through self-exploration of the software are two factors that add to existing literature. These findings augment existing ideas on user-friendliness and training of users proposed by various authors⁵. The factors specifically emphasise the human resources limitations experienced by the small organisation as an important consideration during ERP system selection.

Also, functionalities of the ERP system appear as an important consideration in the literature⁶, but industry-specific functionalities are not mentioned. Based on the findings of the study, certain functionalities such as traceability and forecasting are rated more highly than others because of the specific demands of the industry the organisation operates in. This builds on the research conducted by Baki & Cakar (2005) that found that different organisations value different sets of criteria. Moreover, it was established by Malie et al. (2008) that manufacturing and non-manufacturing organisations in South Africa have different requirements that influence their ERP system selection criteria. Coinciding with industry functionalities are the importance of compliance with and enforcement of export and industry standards regarding local and international quality control standards by the ERP system. As far as previous studies⁷ are concerned, only currency, language, legal and tax regulations and standards are deemed of importance as part of ERP system selection.

The last finding to contribute to existing selection factors in the literature is the ability of the ERP system to assist the organisation in dealing with external industry variables.

⁵Badri et al. (2001, p. 246); Stefanou (2001, p. 210-212); Verville & Halington (2002a, p. 210-212); Ehie & Madsen (2005, p. 554), amongst others.

⁶Malie et al. (2008, p. 26); Baki & Cakar (2005, p. 77-79); Van Everdingen et al. (2000, p. 30), amongst others.

⁷Ziaee et al. (2006, p. 487); Verville & Halington (2002b, p. 194); Ganapathy & Raju (2008, p. 198), amongst others.

In this sense, an ERP system needs to be evaluated during selection on the manner in which it allows an organisation to change its strategies and make fast decisions based on changes caused by variables in the external industry environment. This extends the idea put forward by various authors⁸ that an ERP system should be assessed in terms of how it contributes to the strategy of the organisation.

5.4 Size-specific factor suggestions for SMEs

Based on the findings presented in section 5.2 and their comparison to existing literature in section 5.3, a number of size-specific factor suggestions can be made for organisations similar in size to the one studied. These suggestions recommend that SMEs focus on certain “softer target areas” which incur relatively little costs, but may save these organisations unnecessary customisation and failed implementation costs in the long term. It should, however, be noted that the purpose of these suggestions is not to increase the external validity of the findings, but rather to lay the foundation for the development of theoretical propositions, as indicated in chapters 1 and 3.

1. Unlike larger organisations, SMEs often do not have the financial resources to acquire large and expensive ERP systems produced by ERP system market leaders. Hence they are often forced to select from smaller ERP systems on the market, which perform fewer functions and are less sophisticated in their operations. As a result, it is very important that smaller organisations determine to what extent smaller ERP systems integrate with the IS of their external stakeholders.
2. Where full integration with IS of external stakeholders is not achievable, SMEs should consider how this will affect their operations and address any issues arising from this in the form of a SLAs with the relative external stakeholders.
3. SMEs should also consider other types of software which can be used to perform the missing and limited functionalities not provided by an ERP system from smaller vendors. As part of ERP system selection, it is important that the compatibility of an ERP system with the additional software be assessed. Based on the findings of this study, it may further be useful for SMEs to develop a software use policy. Such a policy would entail dictating which operational tasks have to be completed using an ERP system and when and how data have to be manually transferred between the ERP system and other software. The emphasis of this policy should also be on first exploring the available ERP system functionalities to their full extent, before

⁸Fitzgerald (1998, p. 21); Wei et al. (2005, p. 51); Stefanou (2000, p. 989); Stefanou (2001, p. 207); Teltumbde (2000, p. 4509), amongst others.

a decision is taken to customise the ERP system or employ additional software to complete tasks which can in effect be completed using the ERP system.

4. Similar to the SLAs and a software use policy, a communication and information policy provides an inexpensive solution for SMEs to promote information sharing and collaboration in the absence of full systems integration. By means of this, standards for information reporting and communication can be instilled in an organisation to provide guidelines in areas where the ERP system falls short and manual re-consolidation of data have to take place from time to time. In turn, these guidelines can also function as information and communication standards a selected ERP system must adhere to.
5. In addition to having limited financial resources, SMEs regularly have to deal with human resource constraints. Whereas in larger organisations ERP systems tasks are regarded as the responsibilities of departments, in smaller organisations they often fall to one or more individuals. If these employees are absent or leave the organisation, other individuals have to be trained to effectively manage the ERP system, often resulting in a delay of production processes. For this reason, SMEs may find it useful to assess the level of flexibility different ERP systems afford users to overwrite access rights and continue with production processes.
6. Equally important in this regard is the level of human intervention needed for the ERP system to operate efficiently. Before selecting ERP systems, SMEs may find it useful to first determine the minimum number of people they have available to effectively manage an ERP system on a day-to-day-basis. In addition to this, they need to determine the level of manual intervention required in the event that the ERP system does not fully integrate with other software/external IS.
7. In keeping with this, is the suggestion to assess the level of user empowerment the ERP system offers. A typical instance of this would be to determine how easy and intuitive users find the operation of the software and whether they are able to figure it out by themselves without the help of technicians. If this is the case, they may be less likely to develop manual shortcuts around the ERP system and unnecessarily remove data from the system. To achieve this, users can be involved as part of the ERP system selection process.
8. Furthermore, SMEs may find it of significant use first to determine if certain business processes need to be re-engineered before an ERP system is selected and implemented. Based on the findings of this study, many of the issues associated with selecting a new ERP system are not technical, but rather organisational in nature, and can be improved with relatively little effort through re-design and streamlining. As part

of this, SMEs should focus on the 20% of their requirements which distinguish them from other competitors and assess how different ERP system can best meet these.

9. Lastly, it is important that SMEs consider both the ERP system and its vendor as part of ERP system selection. Compared to larger organisations, SMEs have relatively little in-house IT expertise to assist with the technical aspects and continued maintenance of an ERP system. This creates greater reliance on the part of the SME on the vendor to provide general technical support over and above the ERP system. In this instance, the technical strength of the vendor and its ability and willingness to assist users and the organisation through ongoing support and training, become important.

5.5 Industry-specific factor suggestions for wine practitioners

Based on the findings presented in section 5.2 and their comparison to existing literature in section 5.3, a number of industry-specific factor suggestions can also be made for organisations operating in the wine industry of the Western Cape. Given the current conditions in the WIS market, these suggestions provide certain recommendations wine practitioners and producers should consider before selecting ERP systems. As mentioned in chapters 1 and 3, these suggestions can form the beginning of theoretical propositions to be developed in subsequent studies.

1. It is recommended that wine practitioners assess available ERP system products on the basis of the industry-specific functionalities they provide and the level of sophistication at which each of these functionalities is performed. Based on the findings of this study, it is determined that certain functionalities such as forecasting and traceability, are rated higher than others because of the unique demands of the wine industry. Wine practitioners should therefore determine what they regard as the most important functionalities for their organisation, and based on this, determine the areas they are not willing to compromise on.
2. Available ERP system products should also be evaluated on the basis of the amount of flexibility they provide the winemaker. As indicated by the findings of this study, the ERP system processes cannot be too rigid or cumbersome to complete, as wine-making is in essence a complex, subjective and creative endeavour, influenced and directed to a great extent by the decisions of the winemaker. Possible ERP systems should afford winemakers the needed flexibility to be able to change processes as they receive new information and should allow them to focus on the making of

the wine rather than overload them with administrative tasks. Factors such as the simplification of ERP system tasks to be completed by the winemakers and cellar master, as well as a visual presentation of information can greatly aid in this regard.

3. Apart from assisting the organisation in achieving its strategic objectives, wine producers should also consider how different ERP system products allow the organisation to deal with the impact of external industry variables. As findings have indicated, factors such as weather conditions, quality of grapes/grape juice and the competitive wine market change from year to year and wine producers need to adapt their strategy accordingly. In this instance, the ERP systems should afford them the possibility of making fast turn-around decisions and effortlessly changing their strategy.
4. Wine practitioners may further find it useful to determine the extent to which different ERP system products comply with and enforce export and industry quality control standards. As findings have indicated, it is almost impossible for an ERP system to completely cover all quality control functionalities. However, it is crucial that the system records and provides information on these aspects from as early on in the production process as possible. Not only do winemakers require this information for the purpose of wine-making, but it is also necessary to be able to perform required product traceability functionalities.
5. Lastly, it is recommended that wine practitioners assess ERP system vendors as part of their selection process. Given the small size of the WIS market, it is imperative that wine practitioners determine whether possible vendors are able to provide long-term support and whether they possess the ability to regularly update and develop their ERP systems.

5.6 Synthesis of findings: Towards a theoretical model for ERP system selection

The suggestions presented in the two preceding sections are summarised in an ERP system selection in figure 5.2. The horizontal axis indicates the size of the organisation. This can be mapped on a continuum from large to small depending on the financial and human resources the organisation has to its disposal for acquiring an ERP system. The type of ERP system products available to an SME in the wine industry is mapped in the vertical axis. These can either be generic (used across various industries) or specifically developed to supply in the unique industry needs of wine producers. As one moves up the vertical continuum, ERP system vendors and products become smaller and fewer in

number. For example, more generic ERP system products from vendors such as SAP, Sage and Microsoft can be plotted at the lower end of the continuum, while the more industry-specific WIS⁹ referred to in subsection 3.2.2, will be placed closer to the top-end.

Depending on its size and choice of ERP system product, the organisation can map itself in one of the four quadrants on the model. As is evident from the discussion below, each quadrant presents its own set of benefits and shortcomings, from which different conclusions on ERP system selection can be made.

The upper left quadrant (LS) represents large wine producers who have opted to select a wine industry-specific ERP system solution. These organisations have the financial and human resources to purchase generic ERP system which they then customise by adding winery software to it. The three largest wine companies in South Africa, Distell, KWV and Douglas-Green-Bellingham (DGB), are examples of this type. The lower left-hand quadrant (LG) represents larger organisations who prefer to run a generic ERP system, most likely from one of the market leaders, also used in other manufacturing industries.

Smaller organisations that have the means to acquire a generic ERP system are represented in the lower right-hand quadrant (SG). Such organisations might typically form part of larger corporations or parent companies which purchase the software and force its business divisions to make use of it. For the purpose of this study, the most important is the upper right hand quadrant (SS). This is where the organisation studied and other SMEs in the wine industry of the Western Cape will likely place themselves.

Depending on where an organisation places itself in the model, each quadrant represents a trade-off to be made between different ERP system selection factors. Thus, depending on its size and its preference of ERP system, an organisation may regard certain selection factors to be of higher importance than others. For example, the smaller the organisation, the more important it becomes to select an ERP system that requires less human intervention, empowers users, is more flexible and integrates easily with other software/external IS. Similarly, the more industry-specific the ERP system, the fewer available options for the organisation to choose from. Selection factors such as industry-specific functionalities provided, the flexibility to accommodate wine-making processes, compliance with and enforcement of export and industry standards for quality control and the relationship with the ERP system vendor then become very important.

This can in turn influence the entire manner in which the organisation goes about selecting an ERP system. In the example discussed above, obtaining input from a wine-maker and cellar master as part of the ERP system selection process can be useful. In this way, the organisation can determine which ERP system product provides the most suitable flexibility and sophisticated industry-specific functionalities to satisfy its needs.

⁹As explained in subsection 3.2.2, not all WIS can be classified as complete ERP systems.

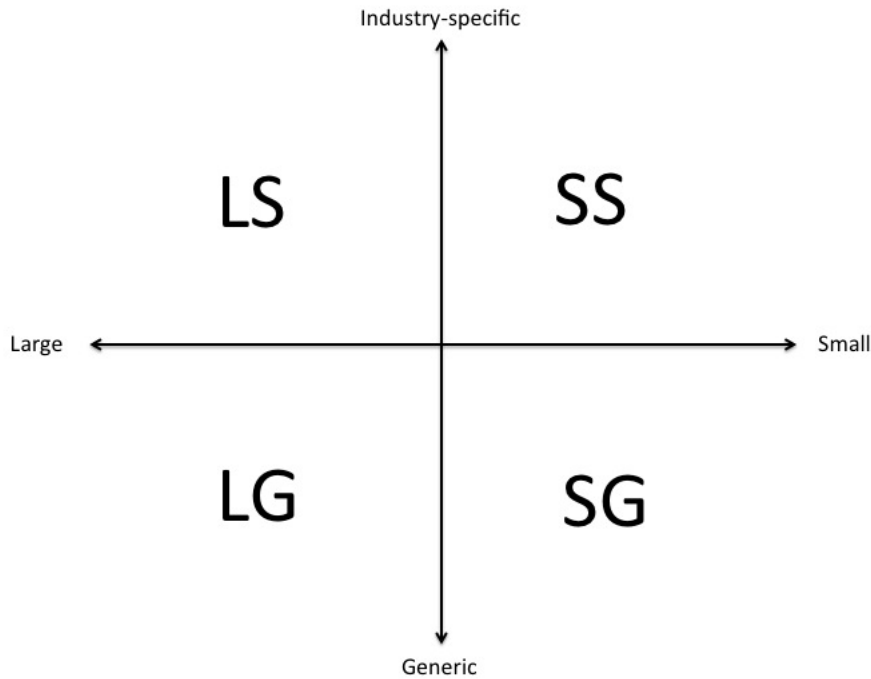


Figure 5.2: Proposed model for ERP system selection in the wine industry

5.7 Limitations

As with all research, this study also has its limitations and weaknesses to be accounted for (Bui, 2009, p. 197). The purpose of this section is to acknowledge these upfront, focus on the variables outside the control of the researcher and describe how these affect the validity of the results of the study (Bui, 2009, p. 198). Limitations are explained in four sections: participants, external experts, questionnaires and timeline. As recommended by Bui (2009, p. 198), each section elaborates on why a variable is considered to be a limitation and allows the reader to judge the impact this may have had on the findings and conclusions of the study.

5.7.1 Participants selected

If the researcher were to repeat the study, a bigger and more diverse purposive sample of participants would be selected. This is said to be a limitation, as most of the findings obtained are based on the opinions of employees in management positions (middle-level and higher-level). The study does not include adequate input from end-users of the ERP system. Although the observations conducted partly reduce this limitation, a definite need exists for more one-on-one interviews with employees who work with the system on a daily basis. These individuals bring different issues to the forefront that are not necessarily considered by employees in management positions. Furthermore, the researcher had limited exposure to the ERP system used by the organisation. Even though this is

not considered to be essential to the purpose of the study, a more in-depth knowledge of the system itself would have assisted the researcher to better understand the ERP system-related problems of the participants.

It is further acknowledged that the customisation of the current ERP system may have influenced the selection factors identified by participants. From the onset of the study, most participants had pre-existing knowledge of how an ERP system operates. Based on this knowledge, they had already formed perceptions of what they expected the new ERP system to deliver. In this sense, the influence of a pre-existing ERP system knowledge base revealed interesting findings about ERP system selection which may also be applicable to other organisations. If the study is to be repeated in organisations that are selecting ERP system for the first time, it has to be noted that the absence of a pre-existing ERP knowledge base may influence the outcome of the findings.

5.7.2 External experts

As previously indicated, the purpose of a single case study is not to generalise findings externally. However, it was decided to include external experts in this study in an attempt to verify the data collected within the organisation. Although many of the findings are indeed corroborated, the sample size of external experts is considered to be too small for results to be generalised externally. In retrospect, a bigger and more diverse sample of external experts might have been a better consideration on the part of the researcher. In addition, if the results are to be generalised on an industry-wide scale, interviews with the bottling, warehousing and distribution companies are further recommended. This may assist other researchers to better understand the important role external stakeholders play with regards to data in the ERP system.

5.7.3 Questionnaires

Given the relative inexperience of the novice researcher with conducting case study research, the questionnaires used are adequate but limited in their scope. Based on the findings of this study, a more comprehensive questionnaire aimed at SMEs in the wine industry can be compiled in future. This will in part reduce the need to verify and further explore data after collection, which has at times been proven to be problematic in this study. Also, if the study is to be generalised to a wider population, questions would have to be more generic and less focused on a specific organisation.

5.7.4 Timeline

The last limitation to be acknowledged is the time-line of the study. Although the time spent conducting this study is regarded as sufficient to provide the researcher with enough

data to answer the research question, further investigation into the ERP system selection process may reveal more notable selection factors. As a result of the time constraints faced by the researcher and delays with the selection process in the organisation, this was unfortunately not possible. Researchers should therefore not consider the findings of this study to provide an exhaustive list of all possible ERP system selection factors. Additional factors can be identified in future studies to augment this list.

5.8 Recommendations for future research

The purpose of this section is to provide future researchers hoping to conduct similar studies with possible recommendations. Recommendations based on the limitations of this study and recommendations for expansion of the study are discussed respectively. If used correctly, these recommendations can help future researchers to modify and strengthen their studies (Bui, 2009, 199).

5.8.1 Recommendations based on the limitations identified

Future researchers can limit or eliminate the limitations listed in the previous section in various ways. Firstly, it is recommended that they select an organisation that is in the process of selecting an ERP system for the first time and with no pre-existing ERP system knowledge base. This may reduce the influence of customisation or other existing ERP system-related issues on the findings of such studies. Secondly, a more diverse sample group, consisting in part of a significant number of end-users of the ERP system can be selected to ensure a wider range of selection issues are covered. Thirdly, researchers may find that familiarising themselves with the workings of ERP system products can be of great assistance in understanding the selection issues identified.

In addition, a larger sample group of external experts is a good consideration if the aim of the study is to generalise the findings to a larger population. External stakeholders from bottling, warehousing, and distribution companies affiliated with the organisation studied should be included as part of this sample. Furthermore, future researchers may find the findings of this study useful as a base from which to compile interview questionnaires. In this way, less time can be spent on unnecessary validation of data after collection, and more time afforded the researchers to focus on the selection process.

The last recommendation in this regard concerns the time line of the planned research. Future researchers should include additional selection phases and processes over and above the ones covered in this study. This may lead to the identification of notable selection factors considered at later stages during ERP system selection. In this way, researchers augment the findings of this research and contribute to building a body of knowledge on

the factors that influence how ERP system selection in SMEs in the wine industry of the Western Cape is conducted.

5.8.2 Recommendations for expansion of the study

As has been indicated in chapters 1 and 3, the purpose of single case study research is not to increase external validity of the findings obtained. However, the researcher acknowledges possible room for expansion of this study to verify the findings obtained by conducting multiple case studies on other SMEs in the wine industry of the Western Cape. This can then be used to further the theoretical model for ERP system selection proposed in section 5.6. The qualitative methods used in this study can be extended to include a quantitative survey of ERP system selection factors in SMEs in the Western Cape wine industry. This might lead to a more comprehensive picture of what SMEs in the wine industry in general consider to be important factors during ERP system selection.

Another possibility might be to conduct a similar study, but from the perspective of the vendors of WIS. The findings obtained here can then be compared to the findings of the studies proposed in the previous paragraph. Given the relatively limited number of vendors catering for this industry, the study is not only feasible, but can assist the industry in developing ERP-related system software more suited to the specific needs of SMEs in the wine industry. On a larger scale, similar studies may be conducted on SMEs operating in bigger manufacturing industries. In this instance, ERP system selection factors for SMEs can be identified and where possible compared to those of larger manufacturers. The findings obtained and the implications of such studies can fill the research gap that currently exists in ERP system selection literature, especially with regards to the South African context.

The proposed ERP system selection model is generic enough that it can also be expanded/adapted to include other industries. Future researchers looking at doing this, may find it useful to plot organisations and ERP system vendors/products on the model at the onset of their studies, as this can give them important information regarding the different trade-offs inherent to the selection of ERP system for their specific cases. In this way, the model can be further validated or rejected.

5.9 Conclusions

In this section, the major conclusions drawn or lessons learned are made explicit to the reader and related to the primary and secondary research questions posed at the beginning of the study (Bui, 2009). The five secondary research questions are each stated and provided with answers. These are then used to answer the primary research question.

Why is it important for an SME to focus on ERP system selection as opposed to implementation only?

In chapter 2, the importance of following a proper ERP system selection process as opposed to proceeding directly to ERP system implementation for SMEs was stressed. Various authors¹⁰ indicate that due to the complexity of ERP system in comparison to other types of software, organisations need to develop unique approaches when dealing with this, especially with regards to selection. Furthermore, a number of authors¹¹ recommend that organisations employ a thorough and holistic or “broad” ERP system selection process, before proceeding to implementation. As explained in subsections 3.2.3.1 and 3.2.3.2, this becomes especially important for SMEs given their unique characteristics and resource constraints.

What are the ERP system selection factors in existing literature?

Also in chapter 2, a review of ERP system selection literature was conducted to determine existing ERP system selection factors. From this, various selection factors were identified and categorised based on their level of significance¹² to this study. Particular emphasis was placed on studies which focus on ERP system selection factors and ERP system selection in SMEs. Subsequently, existing selection factors were grouped according to 18 broadly defined selection categories and summarised in tabular format. This was then used as a framework for the analysis of the case study data. The importance of this lies not only in answering the specific secondary research question, but also in the contribution it makes to the development of this academic sub-field, which has been for the most part neglected by previous research.

What are the size-specific factors that influence ERP system selection?

Based on the findings of the study, a set of size-specific selection factors was identified and discussed in chapters 4 and 5. In summation, these include: integration with external IS and compatibility with existing software; flexibility; policies needed with regards to software use and communication and information standards in the organisation; the importance of some form of BPR; the importance of adequate SLAs to address external stakeholder issues; user-friendliness; extent to which an ERP system depends on human participation to function effectively; the empowerment of users through intuitive and self-explanatory software, and strong vendor-client relationships. The significance of these

¹⁰Verville & Halington (2002b, p. 196); Stefanou (2001, p. 213); Luo & Strong (2004, p. 322-323), amongst others.

¹¹Scott & Vessey (2002, p. 75); Teltumbde (2000, p. 4508); Ehie & Madsen (2005, p. 548); Nah et al. (2001, p. 287); Palvia & Chervany (1995, p. 44); Ganapathy & Raju (2008, p. 194); Stefanou (2001, p. 204), amongst others.

¹²Explicit, implicit through process or implicit through findings.

findings lies in the corroboration, contradiction and, more importantly, the augmentation of existing ERP system selection factors.

What are the wine industry-specific factors that influence ERP system selection?

Equally important, the findings also revealed industry-specific factors which were identified and discussed in chapters 4 and 5. These factors include the following: industry-specific ERP system functionalities; flexibility; user-friendliness; compliance with and enforcement of export and wine industry standards; the extent to which software allows organisations to deal with external industry variables, and the importance of considering the ERP system vendor as part of ERP system selection. As is the case with size-specific factors, these factors do not only corroborate, but also contradict and extend existing research. This strengthens the arguments put forward by Kagan et al. (1990, p. 36) and Kimberly (1976, p. 593-594) that computing needs can differ depending on the type of industry an organisation operates in.

To what extent do the identified factors help to ensure a better fit between SME requirements and ERP system offerings?

It is anticipated that by considering size-specific factors and industry-specific factors as part of a proper selection approach, SMEs within the wine industry of the Western Cape can ensure a better fit between the unique requirements of their organisations and the offerings of different ERP system products on the market. In contemplating the theoretical ERP system selection model proposed in section 5.6, these organisations can further determine which of these selection factors are more important, based on the quadrant they place themselves in.

What are the size-specific and industry-specific factors an SME in the wine industry of the Western Cape considers to be important when selecting an ERP system?

The answers to the preceding secondary research questions have defined and described a host of industry-specific and size-specific factors which are considered important by an SME in the wine industry of the Western Cape. Furthermore, it is concluded that the level of importance of these factors may differ depending on the organisation's size requirements and its preference for selecting an industry-specific ERP system. Based on this, a foundation is laid for the development of an ERP system selection model to further the validity of these findings in future research.

5.10 Chapter summary

The purpose of this chapter is to meaningfully interpret the findings presented in chapter 4. In section 5.2 the problem situation at Pinotage Wine Company was presented in the form of a SSM rich picture. This was followed by a summary and discussion of the main findings from chapter 4. Subsequently, the findings were compared to the literature in section 5.3 and special emphasis was given to how these findings corroborate, contradict and add to existing selection factors. Based on the findings, size-specific factor suggestions for SMEs were presented in section 5.4. Similarly, industry-specific factor suggestions for wine practitioners were recommended in section 5.5. These suggestions were then used to lay the foundation for the synthesis of a theoretical model for ERP system selection. Next, the limitations and weaknesses of the study were acknowledged and discussed in section 5.7. With this in mind, recommendations were made for future research in section 5.8. Lastly, in section 5.9 the major conclusions drawn and lessons learnt from the study were used to answer the secondary and primary research questions posed at the beginning of the study.

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Appendix A

Question Template Used for Organisation

A.1 Generic interview questions

1. Do you make use of the current ERP system?
2. What other applications/systems do you use in your department?
3. What would you say are your biggest frustrations with the current ERP system?
4. Would you say there exists a gap between the requirements of your department and what the current ERP system can deliver?
5. What are the tools/mechanisms developed by your department to overcome these?
6. What improved functionality would you like to see from the new ERP system?
7. Do you interact with third party systems and how do you perceive the electronic data interchange between the current ERP system and these systems?
8. What do you perceive to be the highest risk(s) in your department?
9. Would you like to see some form of business process re-engineering in conjunction with the new ERP system?
10. Was your department informed as to how the selection methodology works and the reasoning behind it?
11. How would you define “success” of the new ERP system and what would user satisfaction mean to you?
12. How do you view the role of the ERP system in your department? What do you expect of the system?

A.2 Specific interview questions

A.2.1 Finance-specific interview questions

1. Would you say that the organisation is in a position to afford a new ERP system? And has a budget been allocated for the project?

A.2.2 Middle Management-specific interview questions

1. How does producing wine (product) differ from other types of products or manufacturing processes?
2. How is quality assurance performed in your organisation?

A.2.3 Technical-specific interview questions

1. What is/are the main reason(s) for choosing a new ERP system?
2. What is/are the business problem(s) you wanted to solve through ERP system acquisition?
3. What do you perceive to be the highest risk(s) that need(s) to be addressed?
4. Do you see your current information system as providing you with a competitive advantage and does it form part of your core competencies?
5. What would you say constitutes an information system at the Pinotage Wine Company? In other words, what are the different dominating concepts? Is your view more deterministic or interpretive?
6. How does your view of an information system influence your selection of a new ERP system?
7. How does the Pinotage Wine Company view its organisation? Does this conform to the traditional view?
8. Does the Pinotage Wine Company see IS as a significant element in their current business strategy that will help it cope with the changing expectations of customers and suppliers and the demands of the market?
9. Do you think your selection methodology also considers the intangible benefits of a new ERP system?
10. Who is your implementation partner?

11. Where did you get your information from regarding vendors? Were they mostly secondary information sources?
12. Have you made sure your consultant is not vendor biased? What is his surname and how does one spell it?
13. Who were the vendors you approached and why?
14. Did you ask the vendors for references and did you contact/visit them?
15. Did the presentations by the vendors only highlight the features of their products or did they go into more detail and clarification?
16. Did you compile a RFI for each vendor and can I perhaps have a look at it?
17. Did you compile a RFP for each vendor and can I perhaps have a look at it?
18. Who is the project champion?
19. How regularly is the project scope documented and reviewed?
20. Do the vendors have any experience with similar SMEs in the wine industry?
21. What would you say are the key management problems in your organisation?
22. Does the current ERP system fully comply with local legal and tax regulations and were these a factor in your decision for a new ERP system?
23. Did you inform the stakeholders of the reasons for your methodology and the methodological steps taken?
24. Do you know of any ERP system survey done for South Africa?
25. Do you make use of an external consultant to assist you with the technical aspects (hardware and software)?
26. Does the consultant have any previous experience with IS and more specifically ERP system selection and implementation in the South African wine industry? And is this an important consideration for you?
27. Do any of the vendors propose using a specific methodology?
28. Did the consultant assist with the requirements analysis?
29. Does your organisation have a communication plan? Would you say it has an open information policy?

30. Would you say the project manager is capable in both technical and strategic project management activities?
31. Do you have a plan in place for the transition of the legacy system and how comprehensive is this?
32. Have you done external benchmarking?
33. Is there a link between the ERP system project's goals and the strategic objectives, vision and mission of the IT division and organisation?
34. Are you going with an all-in-one or a best-of-breed solution?
35. Did you evaluate the current ERP system solely on operational or also on strategic grounds?
36. Have you considered outsourcing the new ERP system?
37. Have you considered any compatibility issues between the ERP system and other applications, hardware and legacy systems?
38. Are you incurring any hardware costs?
39. Have you performed an ERP system readiness assessment?
40. Have you considered making use of middle-ware?
41. How important would you say is a good vendor relationship to you and how will this influence the selection of a new ERP system?
42. Do you think your selection methodology also considers the intangible benefits of a new ERP system?
43. How regularly is the project scope documented and reviewed?
44. What is/are the business problem(s) you wanted to solve through ERP system acquisition?
45. Do you see your current information system as providing you with a competitive advantage and does it form part of your core competencies?

A.2.4 Top-level Management-specific interview questions

1. Would you say that the organisation is in a position to afford a new ERP system? And has a budget been allocated for the project?
2. In your opinion, what would you say is the driving force behind the ERP system project?
3. What would you say are the key management problems in your organisation?
4. Have you considered outsourcing the new ERP system?
5. Did you evaluate the current ERP system solely on operational or also on strategic grounds?
6. Is there a link between the ERP system project's goals and the strategic objectives, vision and mission of the IT division and organisation?
7. Would you say the project manager is capable in both technical and strategic project management activities?
8. Does your organisation have a communication plan? Would you say it has an open information policy?
9. How does the Pinotage Wine Company view its organisation? Does this conform to the traditional view as explained?
10. What would you say constitutes an information system at the Pinotage Wine Company?
11. How does your view of an information system influence your selection of a new ERP system?
12. Would you say your organisation faces greater environmental uncertainty (i.e market forces/changes) than larger competitors in the same industry?
13. Would you say that your organisation has a highly structured decision-making structure?
14. Would you say the ERP system can help the organisation deal with this?
15. Do you see this project as an IT project or a business project and why?
16. How would you describe your role in this whole process?

Appendix B

Question Template Used for External Experts

B.1 Generic interview questions

1. What is your involvement with the (WIS) ERP system industry?
2. What does the WIS environment/ERP system industry look like?
3. How many competitors are there, who has the leading market share and why?
4. What are the unique needs of wine farms that distinguish them from other agricultural sectors?
5. What are the main reasons why organisations purchase these systems?
6. What are the needs of smaller organisations with regards to WIS? How do these differ from larger organisations?
7. What is unique about IS development for the wine industry?
8. What are the main modules WIS can deliver?
9. What is the scope of your wine information system?
10. How well does it integrate with external systems?
11. Would you say your system is able to meet in the needs of smaller organisations?
12. In your opinion, which factors play a role during WIS selection?
13. In your opinion, which factors play a role during WIS selection by SMEs?

14. In your opinion, which factors play a role during wine information systems implementation?
15. What are the main problems encountered by you during implementation?
16. What would you say are the main problems organisations experience with these systems and why?

B.2 Organisation-specific questions addressed at current ERP system vendor

1. When was the original ERP system implemented?
2. Is it true that the company was smaller and the ERP system was run on a Unix-platform back then?
3. Did you implement the entire ERP system package?
4. What version of the ERP system was that?
5. Was the default ERP system installed?
6. Did the organisation make use of any other software at that stage?
7. When did the organisation approach you to tailor the ERP system?
8. Was the ERP system able to meet all the requirements of the organisation at that time?
9. Who are your main competitors?
10. How did they proceed to update/customise the system?
11. At what stage did the vendor-client agreement between you and the Pinotage Wine Company deteriorate as a result of these customisations?
12. At what stage did you notice the organisation started to develop/customise the system in-house and fall behind in updating the software?
13. Do you market your ERP system as being able to meet all the needs of wine producers?
14. Do you anticipate that there might be a gap between the functionalities of the ERP system and the requirements of these organisations?

15. Is it true that certain functionalities might be available, but the organisation has not explored them fully?
16. Have any of your other clients also started to customise their ERP system as the Pinotage Wine Company did?
17. The current system takes between three and five days to roll back during month-end procedures. What is the reason for this and will updated versions of the ERP system also take this long?
18. Would you say this is more a result of the manner in which business processes are conducted within the organisation?
19. How well is your ERP system integrateable with external IS?
20. How many of your clients are SMEs?
21. How adaptable is your system for these organisations?
22. Research has shown that SMEs particularly value flexibility in ERP system. Why would you say your ERP system is more adaptable than other ERP system products available?
23. Where are your company headquarters situated?
24. How big is your market share?
25. Which wine industries are you involved in outside South Africa?
26. Has your focus been on all companies across the board, or have you started focusing more on smaller organisations in recent years?
27. It is not specifically aimed at SMEs?
28. How progressive is the Pinotage Wine Company with regard to training their employees to use the system?
29. How does the latest version of your ERP system differ from the version currently used by the Pinotage Wine Company?
30. Do you think that upgrading their system to this latest update, will solve their problems?
31. IS most of your income is generated by SLAs with clients?
32. If the Pinotage Wine Company were to approach you with suggestions for customisations to the software, would you be willing to assist them in developing these?

33. How long have you been speaking to the ICT Director regarding fixing/replacing the current ERP system?
34. What has the ICT Director communicated to you is the organisation's biggest problem with the current ERP system?
35. How can you better address the needs of this organisation than other competitors?
36. Do you think that users removed tasks from the ERP system and used additional software to complete these tasks, because they perceived the ERP system to be user unfriendly?
37. If the SLA between you and a client is compromised, will you still allocate the same amount of resources to assist them?
38. How many of your clients request configurations of the ERP system and how many of them prefer to keep a default ERP system?
39. What is the extent of these configurations?
40. Do these organisations complain that there is a gap between ERP system functionalities and their requirements?
41. Do bigger ERP system vendors also value an open communication culture with their clients?

Appendix C

Additional Selection Factors from the Literature

Table C.1: Summary of additional selection factors from the literature

AUTHOR(S)	EXPLICIT	IMPLICIT: METHODOLOGY	IMPLICIT: IMPLICATIONS
Lee & Xue (1999)		<p>Approach based on the assumption that a software system is constructed from the point of view of the user</p> <p>Approach recognised importance of handling both functional and non-functional “soft” requirements</p>	<p>Analysed non-functional requirements as a means of constructing a software system with higher user satisfaction</p>
Scott & Vessey (2002)		<p>Approach placed emphasis on the evaluation of risk as ERP selection and implementation</p>	<p>Recognised the important role an open communication culture plays to foster change management in the organisation</p> <p>Took a realistic view of technology and aim to achieve “small wins”</p>

Table C.1: Summary of additional selection factors from the literature

AUTHOR(S)	EXPLICIT	IMPLICIT: METHODOLOGY	IMPLICIT: IMPLICATIONS
Fitzgerald (1998)		<p>Approach was multi-dimensional; Identifies both quantifiable and non-quantifiable costs;</p> <p>Stakeholders had to determine the extent to which the project contributes to the overall business strategy of the organisation</p> <p>Identified and analysed benefits, as well as underlying assumptions used to quantify benefits</p> <p>Assessed impact of the software system (social, political and organisational impacts)</p> <p>Placed emphasis on the information collected by the software system</p> <p>Evaluated flexibility</p> <p>Assessed risks involved</p> <p>Tested business idea in terms of a prototype</p>	<p>Managed the ERP project by employing an experienced project leader</p> <p>Made use of a well-defined methodology</p> <p>Identification of assumptions, understandings and justifications through serious consideration and discussion of topics identified in each stage of the process</p>

Table C.1: Summary of additional selection factors from the literature

AUTHOR(S)	EXPLICIT	IMPLICIT: METHODOLOGY	IMPLICIT: IMPLICATIONS
Verville & Halington (2002)		<p>Planning process used: Participants selected, decided on acquisition strategies; established requirements, presented status assessments and established evaluation criteria</p> <p>Information search process used: Searched for vendor and product information from both internal and external sources</p> <p>Selection process used. Evaluation process used: Comprising both a functional and a technical evaluation of product</p> <p>Choice process used: Scores were given for functionality, integration, ease of implementation, vendor strength/reputation, cost and technical aspects</p> <p>Negotiation process used: Business and legal aspects</p>	<p>ERP systems acquisition is very complex and requires different procedures when dealing with it</p> <p>Information needs to be cross-checked and validated to prevent risk of prejudiced information</p>
Lall & Teyarachkul (2006)		<p>Approach converted multiple attributes into a single efficiency measurement</p> <p>Approach emphasised the identification of the right attributes</p>	

Table C.1: Summary of additional selection factors from the literature

AUTHOR(S)	EXPLICIT	IMPLICIT: METHODOLOGY	IMPLICIT: IMPLICATIONS
Badri, Davis & Davis (2001)		<p>Approach acknowledged the role different criteria play in the selection process</p> <p>Identified the following factors: Costs, risk factors, preference, contingency project constraints; mutually exclusive projects, mandated project constraints, training time and additional man power</p>	<p>Considered resource limitations</p> <p>Combined both objective and subjective criteria</p> <p>Flexible (handled projects of various sizes)</p> <p>Inexpensive</p> <p>Ease of use and understanding by users</p> <p>Stakeholders gained a better understanding of the trade-offs between factors affecting selection</p> <p>Assisted in making efficient use of resource before commitment to a project</p>
Lee & Kim (2000)		<p>Focused on exploiting inter-dependencies between projects</p> <p>Identified multiple criteria</p>	

Table C.1: Summary of additional selection factors from the literature

AUTHOR(S)	EXPLICIT	IMPLICIT: METHODOLOGY	IMPLICIT: IMPLICATIONS
Wei, Chien & Wang (2005)		Project priorities were based on four criteria: Increased accuracy in clerical operations, information process efficiency, promotion of organisational learning and cost of implementation	
Wei & Wang (2004)		Project team formed Collected information on ERP vendors and products Identified characteristics of proposed ERP system ERP evaluation attributes derived from a structure of attributes Approach enabled decision-makers to reach consensus in a group context Approach ensured project objectives are consistent with departmental/company goals and strategy Offered a comprehensive selection approach Allowed for additional section variables to be incorporated	Acknowledge the important role multiple factors play in selection

Table C.1: Summary of additional selection factors from the literature

AUTHOR(S)	EXPLICIT	IMPLICIT: METHODOLOGY	IMPLICIT: IMPLICATIONS
		Offered a comprehensive approach by integrating objective and subjective factors Approach made use of multiple criteria	
Verville & Haltingen (2003)		Comprised a planing process, information search process, selection process, evaluation process, choice process and negotiation process	Key points were raised regarding information use: type and nature of information to be gathered, credibility of the information, credibility of the source, reliability of the information, client referrals from the vendor, outside vendor references, possibility of information overload and confusion
Stefanou (2000)		Approach emphasised a broad perspective on ERP system selection as a result of far-reaching technological, behavioural and organisational impacts Aligned business processes to IT strategy Looked at both current and future requirements of the business Looked at organisational and technical constraints	Commitment of top-management to change

Table C.1: Summary of additional selection factors from the literature

AUTHOR(S)	EXPLICIT	IMPLICIT: METHODOLOGY	IMPLICIT: IMPLICATIONS
		Factors which play an important part in stage three of the approach: requirements fulfilment, functionality of core modules, industry-specific solutions offered, availability and compatibility of extended functionalities, support for critical business processes, availability of external experts, availability of implementation partner, training offered by vendor/third party, vendor's financial position and different pricing models offered	
Stefanou (2001)		<p>Approach viewed business vision of organisation as starting point for ERP acquisition</p> <p>Compared business needs to capabilities and constraints</p> <p>Decided on criteria for vendor, product and implementation partner</p>	<p>Understanding of the major impact ERP systems have on an organisation's business strategy</p> <p>ERP systems are integrative and interact with intra-organisational and inter-organisational users to create a socio-technical system</p> <p>Many of the costs and benefits are qualitative</p>

Table C.1: Summary of additional selection factors from the literature

AUTHOR(S)	EXPLICIT	IMPLICIT: METHODOLOGY	IMPLICIT: IMPLICATIONS
		<p>Evaluated stakeholders' desire and commitment to change</p> <p>Costs and benefits estimated: consulting fees, replacing the legacy system; user training, implementation partners, implementation approaches, completion time</p> <p>Analysed issues surrounding ERP operation, maintenance and evolution: Continuous re-engineering, upgrades, additional functionality, user satisfaction, partner/customer satisfaction and benefits accruing from ERP maturity</p>	<p>ERP systems selection requires a unique approach due to its dynamic nature</p>
Teltumbde (2002)	Strategy-fit	Created an organisational infrastructure: selected a steering committee and evaluation team	Organisations need to follow a proper evaluation process
	Technology	Comprised a context-setting phase: gathered, analysed, engaged with, educated and validated information with stakeholders	A more comprehensive evaluation strategy is needed to consider the strategic impacts and qualitative benefits

Table C.1: Summary of additional selection factors from the literature

AUTHOR(S)	EXPLICIT	IMPLICIT: METHODOLOGY	IMPLICIT: IMPLICATIONS
	Change management Risk Implementability Risk Business functionality Vendor credentials Cost Benefit Top-management approval		Mutual relationship between multiple attributes is organisation-specific
Luo & Strong (2004)			Illustrated the gap that exists between ERP system functionalities and unique requirements of organisations ERP implementation differs from other IS development projects

Appendix D

Classification of Categories

Table D.1: Classification of categories and factors included from the literature

CATEGORY	FACTORS INCLUDED	REMARKS
1. (U) User-related: Factors which have explicit bearing on the proposed users of the ERP system.	User involvement in the design of a system; user preferences; ease-of-use; understanding by users of the system; factors affecting the work done by users of the system; user satisfaction; user buy-in; user participation; human resource development; user-friendliness; opinions of end-users, and further factors which include the empowering of users to form part of the selection and implementation phase.	This category did, however, not include the training of users by the vendor, user interfaces offered by the ERP system or the composition of the ERP selection project team. The core issues in each of these factors were considered by the researcher not to be the user, but rather the vendor, functionality of the ERP system and project management principles respectively.

Table D.1: Classification of categories and factors included from the literature

CATEGORY	FACTORS INCLUDED	REMARKS
2. (V) Vendor-related: Comprised factors relating to the vendor of the ERP system.	Vendor strength and reputation; client referrals from vendors; training offered by vendor; vendor's financial position; vendor evaluation criteria; vendor credentials; importance of a single-vendor solution; external vendor references; long-term relationship with vendor; service and support offered by vendor; vendor's vision; vendor's market position; references of vendor; implementation methodology used by vendor; consulting services offered by vendor; vendor's experience and knowledge of the organisation's area of business; vendor's implementation ability; vendor's research and development; vendor's price of products and services; scale of vendor; vendor's ERP market share; visiting vendor reference site; technical skills of vendor; business skills of vendor; past experiences with vendor; opinions of vendors and mutual vendor-client trust.	Information gathered on the vendor and products, as part of the selection process, where not listed under this category. The reason for this being that the search for relevant information is conducted by the client organisation and not the vendor, and forms part of its larger search for information.

Table D.1: Classification of categories and factors included from the literature

CATEGORY	FACTORS INCLUDED	REMARKS
3. (P) Project-related: General project management principles and activities.	Employing an experienced project leader; making use of a well-defined project management methodology; geographical location of vendor and primary customers; planning processes (selecting participants to form part of the selection process; establishing ERP requirements; presenting status assessments; establishing evaluation criteria; determining acquisition strategies; defining requirements; marketplace analysis and deliverables); contingency project constraints; identifying mutually exclusive projects; identifying mandated project constraints; determining training time; determining manpower required; formation of project team; implementation approaches considered; completion time of the project, setting of a clear vision and mission for the project; project leader; use of project management techniques; acquisition group composition; past experiences of team members; planned and structured process; rigorous process; implementation time; project champion; well-planned acquisition process, and in-house “experts”.	

Table D.1: Classification of categories and factors included from the literature

CATEGORY	FACTORS INCLUDED	REMARKS
4. (Cs) Cost-related: Costs explicitly associated with ERP system selection and implementation.	Identification of quantifiable and non-quantifiable costs; cost, software; hardware and other costs; cost of implementation; consulting fees; budget; project team costs; price of software; support and training fees, and affordability.	
5. (Ls) Leadership-related: Factors with reference to leadership of the organisation or general managerial issues.	Commitment by top management to change; top-management approval; influence of steering committee; clear and unambiguous authority; role of new management; top management support; top management commitment; person in charge of selection process (owners or managers); high-level managerial problems and difficulties and active role of top management.	References made to project champions or project leaders, as these factors were grouped under the heading "Project-related".
6. (St) Strategy-related: Factors which make explicit reference to the strategy of the client organisation or are related to business strategy.	Extent to which the project contributes to the organisation's overall business strategy; objectives of the project are consistent with the goals and strategy of the relevant department and organisation; aligning business processes and IT strategy; understanding the strategic impact an ERP has on the organisation; strategy-fit; alignment between ERP project strategic processes; IT strategic processes and those of the core business as a whole; strategic consideration of factors which affect implementation, and aligning the ERP project with strategic business goals.	

Table D.1: Classification of categories and factors included from the literature

CATEGORY	FACTORS INCLUDED	REMARKS
7. (O) Organisation-related: factors related to the organisation and business in a broader sense.	Political impacts, culture, business processes, vision and mission. Factors which fit this description include: Assessing the political and organisational impacts of the proposed ERP system; organisational learning; current and future requirements of the business; organisational constraints; comparing the organisation's business needs to its capabilities and constraints; business functionality; context setting; relationship between attributes' being organisation specific; organisational requirements; organisational culture; fit with organisational structure; analysis of business processes; business plan and vision; document business processes; organisational processes and fit with current business processes.	
8. (I) Industry-related: factors related to industry-specific knowledge and experience.	Industry-specific solutions offered; organisation-specific relationships between attributes; domain knowledge of the suppliers; different criteria are important to different organisations; vendor's experience and knowledge of the organisation's area of business, and specialised industry knowledge.	Factors that have bearing on other categories (i.e vendor and organisation) were also grouped accordingly.

Table D.1: Classification of categories and factors included from the literature

CATEGORY	FACTORS INCLUDED	REMARKS
9. (Re) Research-related: Factors involving information searches, sources of information and general research on possible ERP system vendors and products.	Information searches using both internal and external information sources; collection of information on ERP vendors and systems; importance of professional reports and interviews with ERP vendors to select the right ERP software; type or nature of the information to be gathered; credibility of the sources (whether internal or external); credibility of the information to be gathered; reliability of internal and external sources; reliability of the information that was obtained; outside references; client referrals from vendors; possibility of information overload and confusion; gathering, analysing, engaging, educating and validating information with stakeholders; accurate information, information gathered on ERP system factors and vendors from a variety of sources; computer/IS trade magazines and software leaflets.	

Table D.1: Classification of categories and factors included from the literature

CATEGORY	FACTORS INCLUDED	REMARKS
10. (T) Technical: Factors with any direct references to the functionalities and attributes of the proposed ERP system, state of the organisation's system, and technology in general.	Taking a realistic view of technology; information collected by the system; flexibility of the system; how practically implementable the system is; testing in terms of a prototype; functional and technical evaluation; integration; ease of implementation; technical aspects; information processing efficiency; requirements fulfilment; functionality of core modules; availability and compatibility of extended functionalities; support of critical business processes; technical constraints, technology; legacy system transition plan; replacing obsolete systems; changing to a client-server environment; performance of the ERP system on a wide area network (WAN); technical criteria; system reliability (incorporation of best practices and latest industry trends); compatibility with other systems; ease of customisation; fit with parent/allied organisation systems, full cross-module integration; IT infrastructure of the organisation; network architecture and security; module completeness, standardisation of data; language and currency of the proposed ERP system; ease of in-house development and upgrading; use of newest capabilities of IT; shorter processing times; minimum of errors; maintainability; availability of hardware/software package; availability of source code; complexity of the system; customised functionality; quality of the ERP system; selection based on product characteristics (as opposed to vendor characteristics), and scalability.	Factors regarding the output or processing of information by the ERP system were grouped as part of this category, and not the previous one. The reason for this is that the focus is on the ERP system, where in the "Research-related" it was on information researched.

Table D.1: Classification of categories and factors included from the literature

CATEGORY	FACTORS INCLUDED	REMARKS
11. (Ri) Risk-related: Factors directly referring to general risks related to the selection and implementation of ERP system.	Evaluation of risk as part of ERP selection and implementation; risk assessment; risk factors, and risk in general.	Except for Scott and Vessey (2002), none of the other authors were explicit about the different types of risks involved in ERP selection and implementation.
12. (E) External Experts: Consulting- and implementation partner factors.	Availability of external experts; training offered by external stakeholders; implementation partners, consultants (preferably with experience in the same industry as that of the organisation); consulting services; external consultants and outside personnel acquaintances.	
13. (B) Benefit-related: Estimated benefits acquired through the use of the proposed ERP system.	Identification of the benefits (as well as the underlying assumptions to the quantification of the benefits); estimate benefits, and benefits in general.	
14. (Co) Communication-related: Factors relating to general communication and information sharing in the organisation as part of the selection process.	Recognition of the role an open communication culture plays to help foster change management; communication plan and open information policy; effective communication; proper communication of decisions and resultant change, and clear communication and information exchange between client organisation and vendor.	

Table D.1: Classification of categories and factors included from the literature

CATEGORY	FACTORS INCLUDED	REMARKS
15. (Ch) Change-related: Change as a result of ERP system selection and implementation and how this should be anticipated and addressed.	Change management; evaluation of the stakeholders' desire and commitment to change; anticipation of the cultural and structural changes to be brought about by implementation; change management program and culture; organisational changes resulting from module implementation, and resistance to change.	
16. (BP) BPR-related: Factors referring to some form of business process re-engineering (BPR) as part of the selection process.	Conducting BPR; in-depth investigation into the processes which ought to change with ERP acquisition; continuous re-engineering; some form of BPR and process re-engineering.	
17. (Si) Size-related: Factors relating to the size specifics of the organisation and how these influence the selection of ERP system.	Size-economics (of client organisation and vendor); larger SMEs are more likely to adopt an ERP system; choose an ERP system from vendors other than the market leaders (smaller vendors); and the importance of the client organisation and vendor to be similar in size.	
18. (Lg) Legal: Factors related to legal matters concerning ERP system selection and implementation.	Legal negotiation process; ownership and availability of the source code, and performance guarantees.	

Appendix E

Additional Selection Factors from Data Analysis

Table E.1: Additional factors identified by participants in subunits

FACTOR	FINANCIAL	MIDDLE MAN- AGEMENT	TECHNICAL	TOP-LEVEL MANAGEMENT
Project-related:	Informed on how ERP system selection works; not sure if this is clear to lower-level employees.	Informed on how ERP system selection works; not informed on possible vendors and products to be considered.	Project champion identified; project scope reviewed on monthly basis; informed of how ERP system selection works; project manager conducted individual employee interviews; not informed on possible vendors and products to be considered.	Informed on how ERP system selection works; project manager seen as both technically and strategically capable.

Table E.1: Additional factors identified by participants in subunits

FACTOR	FINANCIAL	MIDDLE MAN- AGEMENT	TECHNICAL	TOP-LEVEL MANAGEMENT
Cost-related:	No budget has been allocated for this project: First assess if this is an ERP system issue or an organisational one; budget for requirements analysis approved; organisation not in a position to afford new ERP system.		Cost will influence choice of ERP system.	No budget for this project has been allocated: First need to assess return on investment (ROI).
Strategy-related:	New ERP system might not shorten production time	Vision of organisation has to adapt to changing environment and influences expectations on the part of the role ERP system should fulfil	ERP system currently inhibiting organisational strategies; IS currently not seen as a strategic element in business strategy;	strategic driving force behind ERP system project: Evaluate extent to which it will automate business processes; ERP system project in line with the strategy of the IT division and that of the organisation; ERP system needs to support the business' strategy.
Research-related:			Only secondary sources used to gather information on vendors and products; attempted industry benchmarking, but organisations approached were not forthcoming.	

Table E.1: Additional factors identified by participants in subunits

FACTOR	FINANCIAL	MIDDLE MAN- AGEMENT	TECHNICAL	TOP-LEVEL MANAGEMENT
Risk-related:	Accuracy of cost and other data for decision-making purposes; system's limitations; human intervention; employee absence/cessation; "workarounds" developed to overcome shortcomings of the ERP system.	Human intervention; accuracy of stock data (dry and finished goods); failure to achieve sales volume objectives as a result of faulty forecasting; ERP system too process-dependent on internalised knowledge of employees; employee absence/cessation.	Platform and integration of reporting system is not technically sound; accuracy of stock data; human intervention; traceability.	Failure to match production facility to forecasting.
External Experts:		Implementation partner to be considered as part of selection process; a vendor-impartial consultant assisted with requirements analysis.		
Benefit-related:		Aware that certain benefits of the ERP system might be intangible and only manifest after a period of time has passed.		
Communication-related:			ERP system expected to foster data collaboration between employees; organisation currently has no open-information policy.	Organisation currently has no open-information policy.

Table E.1: Additional factors identified by participants in subunits

FACTOR	FINANCIAL	MIDDLE MAN- AGEMENT	TECHNICAL	TOP-LEVEL MANAGEMENT
Change-related:			Change management considered; obtained support from Learning and Development coordinator to assist in dealing with employees' fears and inadequacies.	
BPR-related:	Organisational processes to be streamlined.			
Leadership-related:				Convince management team that the organisation needs a system that is competitive and suits the organisation's needs.
Size-related:			Human resources needed to drive ERP system processes is limited.	