AN INVESTIGATION INTO USER INTERFACE FACTORS IMPACTING ON USER EXPERIENCE: PASTEL ACCOUNTING CASE STUDY

By

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DECLARATION

I, Mashapa Job declare that:

- The work in this dissertation is my own work.
- All sources used or referred have been documented and acknowledged.
- This dissertation has not previously been submitted in full or partial fulfilment of the requirements for an equivalent or higher qualification at any other recognised education institute.

Job Mashapa
15 December 2009

Abstract:

The purpose of this research is to propose metrics to evaluate the user interface factors that impact on the user experience of Software Accounting Applications (SAAs) used to support the accounting business activities in Small Medium and Micro Enterprises (SMMEs) operating in developing countries.

The research commences by outlining the conceptual background that introduces the study. In the introductory chapter, the problems together with the objectives that motivate the significance of the study are presented. In the same chapter, the overall research focus and how each of the research questions are treated to accomplish the intended goals are defined.

In Chapter 2, the typical accounting business activities for SMMEs operating in developing countries are investigated. Findings from the preliminary survey revealed that Pastel accounting is the commonly used SMME accounting application used in developing countries. Inventory management, cash book processing, preparation of financial statements, customer and supplier documents processing are revealed as the most prevalent SMME accounting activities. This chapter highlights the problems that inhibit the implementation and the delivery of full benefits of using these SAAs.

After indentifying the SAA problems, user experience aspects of the SAA are addressed in Chapter 3. User experience (UX) is defined and existing UX evaluation criteria are discussed. The findings form the basis for choosing the applicable criteria for evaluating the User Interface (UI) factors impacting on the UX of Pastel accounting.

The proposed user experience evaluation metrics are described in Chapter 4. A discussion on how the metrics are implemented and what UI aspect they measure is presented. The research design and methodology followed is discussed in Chapter 5. The chapter outlines the possible research philosophy, strategy, methods and data collecting methods. A choice is made about the appropriate approach to answer the stated research questions to satisfy the intended overall research objective. A phenomenologist, qualitative inductive approach is adopted in the study. A contextual inquiry case-study strategy is chosen as applicable to this research. Data is collected using expert reviews, user observation and subjective questionnaires.

After the choice of the research techniques, the case study results are presented and analysed in Chapter 6. It is found that Pastel UI is attractive and the users are happy with the visual design of the application. The major factors that impact on Pastel accounting are its lack of

feedback and its complexity which makes it difficult for first time users to use the application and the paucity of the help function.

After the observed findings, the conclusions and recommendations of the research are presented in Chapter 7. It has been concluded that Pastel accounting UI fails to captivate a positive user experience for first-time users; the users do not find the expected help from the Help function and are often left wondering about the status of the system and the outcome of their actions on a task. Recommendations on how designers would make Pastel user interface more helpful, easy to use, and provide adequate feedback are presented in Chapter 7.

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Table of Contents

LIST OF FIGURES

Chapter 1

Chapter 2

Chapter 3

Chapter 5

Chapter 6

LIST OF TABLES

Chapter 1

Chapter 2

Chapter 3

Chapter 4

Chapter 5

Chapter 6

Lists of terms and abbreviations used in this research

SMME	Small Medium and Micro Enterprises operating in the developing countries.
User Interface (UI)	The intermediate medium through which the users interact with the computer, it is not just how it looks; it is how easy it is to learn, how well it recedes into the sub-consciousness of experienced users, and how well it supports tasks of users.
User experience (UX)	The overall subjective specific individual's / group's emotions, feelings and attitudes arising before, during and / or after a user's interaction with a product to perform a specific task in a specified context.
Software Accounting Applications (SAA)	Automated accounting tools used to support business accounting activities.
Usability	The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.
DTI	South Africa Department of Trade and Industry.
ERP	Enterprise Resource Planning

CHAPTER 1: INTRODUCTION

1. Background

The push and pull factors of globalisation, increasing business competition, rapid technological advancements and growing business stakeholders' expectations and demands characterize the current business environment. Such a business environment enhances the creation of a one world, virtual market-place which supersedes the global, geographical business divide (Brinkman & Brinkman, 2002; Chen, 1998). While organisations in the developed countries are advanced in adoption of latest information communication technology (ICT) implementations, those in developing countries still lag behind (Iyanda & Ojo, 2008; World Bank, 2006). This inequality makes the competitive platform uneven which results in organisations in the developing countries losing out on competitive advantages and sustainable business opportunities. The implementation of ICT related technologies has allowed organisations to engage in global business transactions without hindrances due to geographical boundaries (Schmid et al, 2001). The scant adoption of ICT in developing countries is more pronounced in SMMEs when compared to large organisations operating under the same environmental constraints (Cloete et al, 2002).

Small Medium and Micro Enterprises, often referred to as "economy growth engines" (Brouthers et al, 1998), play a significant role in the economic development of a country. Some of their contributions include poverty alleviation, the generation of employment, an increase in competitiveness and export capability and rural and social development (Sutton & Berth, 2007). Despite the SMME contributions, organisations face both significant and unique challenges that have a profound impact on their effective participation in the global market place and their ability to compete internationally. The lack of access to ICT resources at affordable prices and the lack of knowledge by the stakeholders in the SMMEs on business benefits that result from e-business and e-commerce are factors that inhibit the adoption of ICT resources by the organisations to support their businesses (Cloete et al, 2002).

There is a need for the organisations to penetrate the global market arena when considering the importance of SMMEs in developing countries. Therefore, the organisations need to implement affordable and sustainable SMME-specific, ICT products. Computerisation and office automation is becoming commonly accepted in the SMMEs of developing countries. Software developers and vendors have become aware of the increasing penetration of computerisation in the SMMEs of emerging economies. In turn, the software developers have

shifted focus to design SMME-specific products that support the business needs of small organisations. Examples of such products include accounting packages, payroll management packages and human resources management information systems. Developers emphasise the functionalities of the applications and pay little attention to their usability and their UX requirements. This results in the deployment of these applications tools lacking usability and failing to appeal to a positive user experience while interacting with the applications.

Launder (1995) states that 80% of software maintenance costs are as a result of human-system interaction problems and only 20% result from technical failures. Poorly designed software applications fail to cope with business process requirements and are highly vulnerable to become immediate legacy systems (Oboler, 2007). Perry (1989) mentions poor UI as one of the major causes of system failures. An investigation into the usability of Enterprise Resource Planning (ERP) applications by Forrester Research found that many applications fail on overall usability (Gilbert, 2003). In a study conducted by International Foundation of Science (IFS) to enhance usability, customers revealed that the top challenge they faced was that different parts of their system worked in different ways, had different commands and required different types of interaction (Matthews, 2008). Matthews (2008) goes on to comment that the complexity and difficulties in navigating through enterprise applications is the main barrier that prevents software systems from delivering their potential benefits in a changing environment.

It becomes vital, given this usability failure rate, to research the UI factors that impact on the usability and user experience of a typical software application that is commonly used in developing countries. The benefits of good UI include (Myers, 1994):

- Reduced costs;
- Increased application package scalability and flexibility;
- Fewer human errors during data processing errors;
- Reduced user disruption;
- Reduced burden on support stuff;
- Elimination of training costs;
- Avoiding changes in software after release.

The focus of this research is to investigate the UI factors that impact on the UX and usability aspects of a selected accounting tool. Figure 1.1 summarises the study domain, study area of interest, concentration and focus of this research.

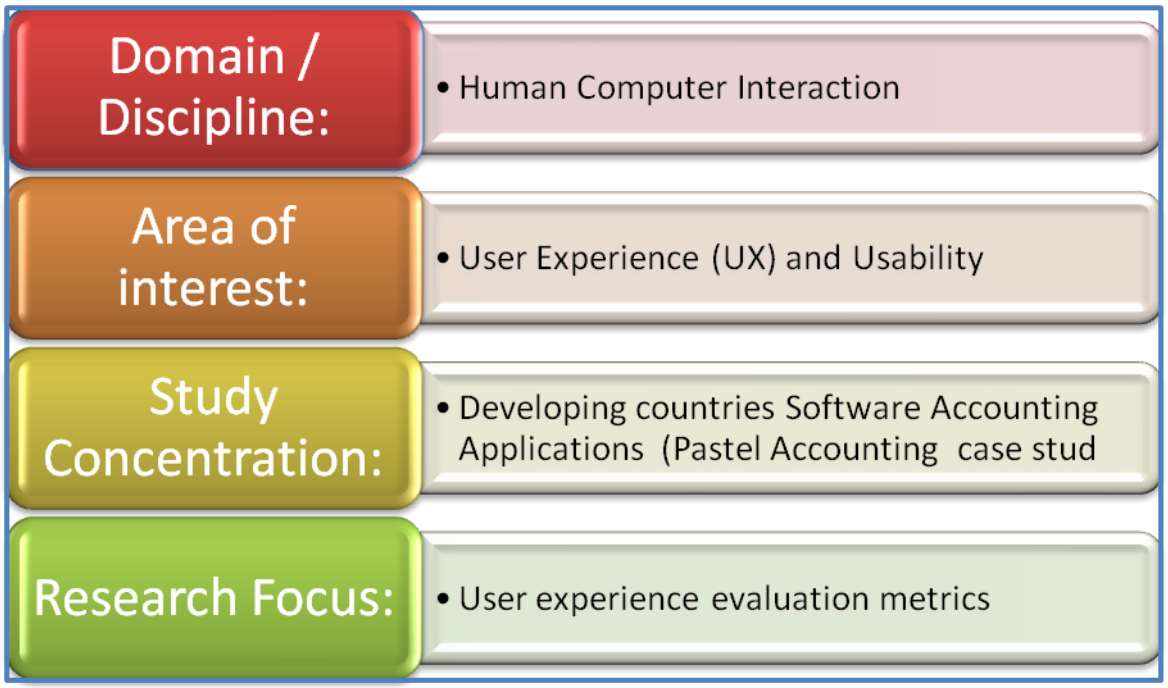


Figure 1.1: Research dimension overview (Adapted from Hofstee, 2007)

This research lies in the Human Computer Interaction (HCI) field with precise interest in usability and UX. The research concentrates on the UX and usability issues of a chosen SAA predominately used to support the accounting needs of typical SMMEs in developing countries. The purpose of this research is to propose metrics for evaluating the UI factors that impact on the selected SAA user experience. The study seeks to improve the accounting tool in terms of its user friendliness, simplicity and ease of use based on the feedback by the users on their experience during and after interacting with the application.

1.1. Problem statement

This study approaches the research problem from a two dimensional view namely "*practical problem*" and "*core problem*" (Mouton 2001).

The *practical problem* researched in this study is based on the realisation that business application tools fall short on usability (Gilbert, 2003). SAA used in the SMMEs of developing countries are not spared

Core problem: The core problem is based on the following problem statement:

This research will propose metrics applicable to evaluate the UI factors impacting on the user experience and usability of a selected SAA used in SMMEs.

This study will investigate what UI factors have to be considered to improve the user friendliness, ease of use, usability and overall positive satisfactory UX of the SAA.

1.2. Research questions

The following research questions help address the core problem and provide proposed solutions to the practical problem.

Main research question

What metrics can be used to evaluate the UI factors that impact on the UX of a typical SAA used to support the SMME accounting activities in a developing country?

Subsidiary research questions

- What are the typical SMME accounting business processes in the business environment of developing countries?
- How can the UX of an accounting tool be evaluated?
- What are the UI factors that prevent the SAA users from successfully completing their tasks with satisfactory UX*?*

1.3. Research objectives

This research seeks to improve the UX, user friendliness, ease of use and usability of tools used to support the SMME accounting business process in the environment of developing countries.

Primary objective

To propose metrics for evaluating the UI factors that impact on the UX of a typical SMME accounting tool used in a developing country business environment.

The following *secondary objectives* need to be achieved to accomplish the primary research objective;

- To investigate the typical SMME accounting business processes in a developing country.
- To examine the existing UX evaluation methods to establish the applicable criteria for evaluating the UX for the SAAs.

- To determine the SAA UI factors that impedes the users from successfully completing their tasks and reducing overall positive UX of the application.

1.4. Research methodology

This study research design and methodology follows the research process 'onion' postulated by Saunders et al (2003).

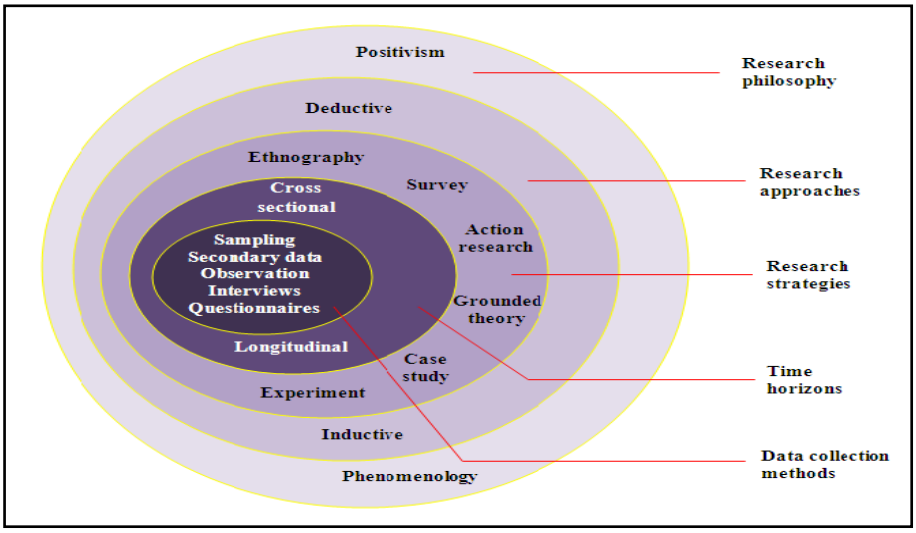


Figure 1. 2: Research process onion (Source; Saunders et al, 2003)

This research takes the *phenomenology* philosophical paradigm. Phenomenology is based on the assumption that research subject meanings are best understood through observable lived experience rather than explaining quantifiable measurement (van Manen, 1990). A *qualitative deductive* reasoning approach will be employed to gain an in-depth understanding of the UX factors of the SAA. A *context enquiry* based, *case study* is followed to address the problem statement, provide answers to the research questions and attain the overall research objectives. The following data collecting methods are used:

- Literature study;
- User observation;
- Questionnaires;
- Expert review.

Table 1.1 relates the research questions to the respective research objectives and data collecting method that are used in this study.

Table 1.1: Research Design

Research question	Research objective	Objective type	Data gathering technique/s
What metrics can be used to evaluate the UI factors that impact on the UX of a typical SAA used to support the SMME accounting activities in a developing country?	To propose metrics for evaluating the UI factors that impact on the UX of a typical SMME accounting tool used in a developing country business environment.	Primary	Case study results analysis, conclusion and recommendations
What are the typical SMME accounting business processes in the business environment of developing countries?	To investigate the typical SMME accounting business processes in a developing country.	Secondary	Questionnaire based survey, Literature study
How can the UX of an accounting tool be evaluated?	To examine the existing UX evaluation methods to establish the applicable criteria for evaluating the UX for the SAAs.	Secondary	Literature study
What are the UI factors that prevent the SAA users from successfully completing their tasks with satisfactory UX?	To determine the SAA UI factors that impedes the users from successfully completing their tasks and reducing overall positive UX of the application.	Secondary	Context inquiry (user observation, think aloud, after tests questionnaire), expert reviews.

A study on existing literature forms the basis for the conceptual framework on which this research is built upon. The following aspects are investigated through a study of the existing literature:

- Typical characteristic of SMMEs in developing countries, in terms of their accounting business processes, business needs and user profiles.
- Existing UX evaluation methods, principles and criteria and how these can be applicable to evaluate the UX of SAA used in SMMEs.

Context enquiry experimental design in the form of user observation helps in determining the experiences of the user interaction with the tool in performing specific tasks. After the users have finished the given tasks, they are given a questionnaire to complete to rate their overall experience of interacting with the system. The questionnaire is based on a list of proposed metrics. The findings from user-based observations, literature study and subjective satisfaction questionnaire are triangulated with expert review evaluations. The expert review checklist has similar evaluation components to those in the after-test questionnaire. Thereafter, applicability of the proposed metrics can be validated.

1.5. Research Scope

The scope of this research is limited to a SMME-specific SAA. The study concentrates on SMMEs operating in the developing countries environment. Only SMME organisations who have automated their accounting business processes are considered. The emphasis of the research is the UI factors of the accounting application that impact on its UX. The research focuses on subjective, user hedonic opinions during and after their interaction with the tool. No time bound, performance-related measures are evaluated. The functionality aspects of the SAA are not directly examined, except where it collaborates the research conceptual framework or where it affects either usability or UX. Thus the resulting proposed metrics will serve the purpose of evaluating the subjective UX during and after the interaction of the users with the application.

1.6. Outline of chapters

This research study chapters fit into five distinct categories namely:

- Introduction;
- Literature study;
- Experiment design;
- Case study results presentation and analysis;
- Recommendations and Conclusion.

Figure 1.3 illustrates how the chapters are structured and fit in the respective categories.

Figure 1.3: Outline of chapters

Chapter 1 presents an overview of the overall research in terms of the study domain, and the research focal area. The chapter provides the overall study background information, problem area, purpose of the study, research methodology, research objectives and the relevance of the research output. The context of the research, study limitations and scope are presented.

Chapters 2 and 3 form the foundations of the research conceptual framework. The two chapters involve an intensive literature study to collaborate the conceptual framework of the researcher. Chapter 2 focuses on the typical characteristics of SMMEs operating in developing countries. Their contributions, challenges and user profiles and the preferences of the users are researched in Chapter 2. An overview is given of accounting tools and prevalent

SMME accounting business activities and their benefits and the problems associated with their usage are investigated. Chapter 3 presents a detailed study of UX existing definitions, fundamental building blocks, UX goals and user interface factors impacting on UX and usability. Various methods and criteria that can be employed to evaluate UX are discussed. The applicable methods to evaluate UX and usability of the SAAs used in SMME are selected. Chapter 4 presents a discussion on the metrics proposed for evaluating the UI factors of the application that impact on UX.

Chapter 5 focuses on the research design and methodology followed. The research philosophical stance that is adopted is justified as being most suitable in this research. In the same chapter, the research approach, strategy, data collecting techniques and triangulation are discussed. The selection of the SAA, research participants and test tasks for evaluation is described.

Chapter 6 is a case study based on Pastel Xpress accounting. It is an investigation of its UX and usability aspects from the users' subjective view about their interaction with the application. Case study results are presented and analysed in this chapter. Chapter 7 provides the recommendations for the proposed accounting tools UX evaluation metrics. The chapter concludes the research with a summary of its achievements, study constraints encountered and possible future research to improve on the authenticity of this study.

CHAPTER 2: SMALL MEDIUM and MICRO ENTERPRISES ACCOUNTING TOOLS

2. Introduction

The purpose of this chapter is to investigate the typical characteristics of SMME with specific focus on their accounting needs. This section addresses the following research question

What are the typical SMME accounting business processes in the business environment of developing countries?

The chapter focuses on profiles of SMMEs for the following aspects:

- The contributory role of SMMEs to economic growth;
- The generic challenges faced by SMMEs in emerging markets;
- The nature of accounting business transaction in SMMEs;
- The common accounting tools used to support the accounting activities in SMMEs.

The chapter investigates how the business operations differ between similar sized organisations in both developing and developed countries. In this chapter, an overview of the common SMME accounting business processes and the applications used to support the accounting activities is presented. The chapter concludes with the benefits of implementing usable accounting systems to promote the success and sustainability of the organisation in the competitive global market place.

2.1. Developing countries Small Medium and Micro Enterprise*Defining SMME*

Although significant research on SMMEs has been done, attaining a universally accepted definition is still a deficit, both in research and academia (Bannock & Peacock, 1989; a3consulting, 2006). The criteria for defining SMMEs vary from country to country and with the nature of business of the organisation. The Bolton Committee Report (1971) highlighted the following characteristics that define an SMME:

- *The area of operations of the organisation is primarily local, although the market is not necessarily local;*
- *The business is small in comparison with the larger competitors in its industry;*
- *The business has a relatively small market share;*

- *The business is independent and is managed by its owner or part-owners.*

In the United States of America (USA), a small business is defined as one which does not play a principal governing role in its industrial sector of operation and is solely owned and is operated without a formally-structured, management hierarchy (Bridge, O'Neill & Cromie, 2003).

The European Union defines SMMEs according to the following quantitative classification as tabulated in Table 2.1:

Table 2.1: EU SMME definition (Source: Bridge, O'Neill & Cromie , 2003)

Maximum values	**Micro**	**Small**	**Medium**
Number of employees	10	50	250
Turnover (Euro m)	N/a	7	40
Balance Sheet total (Euro m)	N/a	5	27
Independence criterion	N/a	25%	25%

For an organisation to qualify in the USA SMME category, it has to meet the quantitative values of number of employees, annual turnover values, balance sheet totals and the independence criterion as presented in Table 2.1.

South Africa Department of Trade and Industry (DTI) defines an SMME as privately and independently or co-operatively owned and managed organisation which adheres to at least any two of the stipulated quantitative criteria. The quantitative classification is based on permanant staff head count, non-fixed assets value and anual turn-over figures. Table 2.2 tabulates the DTI SMME classification (DTI, 2004).

Table 2.2: South Africa DTI SMME classification criteria (Source: DTI, 2004)

Size	Full time staff head count	Annual turn over	Non fixed assets value
Micro	Less than 5	Less than R1.25m	Less than R0.25m
Small	5-50	Less than R 5m	Less than R 1m
Medium	51-200	Less than R 25m	Less than R5m

Based on the definitions, an SMME is defined as *an organisation in which the owner(s) have ultimate control on its business activities, with its operations targeting a specific sector niche and having a small market share.* The DTI threshold figures are used to classify an SMME in this research. The study focuses on organisations having a full time staff head counting ranging between 5 and 200 people, an annual turnover value less than R25 million and non-fixed assets value less than R 5 million.

2.1.2. SMMEs economic contribution

Globally, the importance of SMMEs cannot be understated. Small organisations have become the engines for economic growth. SMMEs contribute significantly to poverty alleviation, employment generation and economic and social development (Baker, 2003; McGrath, 2005). SMMEs have an in-depth understanding of the business values, rules and regulations of the local environment in which they operate (Sutton & Berth, 2007). This understanding strategizes them to be significant sources of innovation in business and contribute towards economic growth. SMMEs play a critical role in labour absorption, creating new markets, and economic expansion. In emerging economies, SMMEs contribute largely to poverty alleviation, generation of employment, increase in competitiveness and export capability. The small organisations are active instruments for rural and social development and they are flexible and respond quickly to market changes and opportunities (Berry, von Blottnitz, Cassim, Kesper, Rajaratnam,and van Seventer , 2002).

Current literature on statistical data of SMMEs is scarce and poorly documented (Ntsika, 2001). In South Africa, SMME businesses have a major role to play in employment creation, income generation and output growth (Chalera, 2007; McGrath, 2005). There is no consistency in the actual number of SMMEs operating in South Africa (Rogerson, 2004). It is estimated that there were between 1.6 and 3 million SMMEs operating in South Africa by end of 2005. The SMMEs, as a group, represent a ratio of about 97% of the total number of South African organisations (A3Consulting, 2006). The SMMEs account for three-quarters of employment in South Africa, of which micro-enterprises account for about 40 percent. SMMEs generated around 30 per cent of the country's Gross Domestic Product (GDP) in the 2004 to 2005 period (African Outlook, 2004/2005).

In Botswana, it is estimated that there are roughly 56 300 SMMEs operating in the country, employing 125 000 people, which includes the business owners. In a 1996 study of the role of SMMEs in Botswana, their contribution to GDP was estimated at 30-45 percent, while that of

large firms was estimated at 38-48 percent. SMMEs are believed to account for 15 per cent of formal employment, implying that job creation is one of their most important contributions (African Outlook 2004/2005).

These narrations reveal how important SMMEs are in any economy. Another contribution is that they act as major suppliers of raw materials and services to the major organisations. The small organisations are the seedbeds for the larger multinational companies (Brooger, 2009).

Despite these contributions, SMMEs face challenges which both are generic and specific. The business operating environment is not lenient towards them, but they must adapt to the stringent business conditions to ensure their sustainability and survival. They compete for the same resources, customers and suppliers as the established multi-national companies. Such competitive business operations are global and SMMEs in developing countries are under threat from the developed countries. These competitive forces greatly impact on the SMMEs in emerging economies when compared to their counterparts in the developed world.

The following section outlines the challenges faced by the SMMEs operating in the developing countries business environment. The generic problems that impact on these SMMEs are discussed. The section aims to unveil the nature of accounting business processes in the SMMEs. Typical SMME business operations are differentiated from those of SMMEs in developed countries and large organisations operating under the same emerging economies environment.

2.1.3. Generic challenges faced by developing countries SMMEs

Globally, SMMEs face a variety of complex and demanding problems to the smooth running of their business. Globalisation and rapid ICT development has lead to the creation of a global virtual market-place. SMMEs derive their sustainability and competitive edge from their ability to participate in this global business arena. They, however, face specific challenges that inhibit them from being active players in the international market. These challenges can be categorised into those internal and external to the organisation (Kapurubandara & Lawson, 2006). Internal challenges are those from within the organisation which can be controlled. External challenges are those outside problems posed on the organisation which are beyond its control. Internal problems include a lack of managerial skills, the lack of capital and insufficient information about how to run business. The external challenges include infrastructure, social, cultural, political, legislative and regulatory requirements.

These challenges have a profound impact on the SMMEs in developing countries. They fail to have access to capital or business start-up funding. Financial institutions and micro-finance houses do not feel secure to take the risk of lending funds to the SMMEs (World Bank, 2006; Rogerson, 2008). This is because the SMMEs do not have fixed assets which they can use as collateral. This means that the SMMEs operate under tight budgets. This hinders them in competing with the large organizations and overcoming the rapid technological changes and product varieties innovativeness. Compared to the large organisations, SMMEs employ people who are not specialists in the specific business processes and they cannot afford to remunerate qualified personnel. The SMMEs are slower in adopting new ICT when compared to the large organisations. SMMEs suffer from a deficiency of information about how to effectively and efficiently run their businesses for strategic sustainability.

The SMMEs in developed countries are keeping abreast with technology, while similar sized organisations in the developing countries still lag behind in implementing IT-based transactions. There is low technology acceptance in the developing countries and to a greater extent, SMMEs. Most of the business transactions in the developed countries are electronic based (e-business and e-commerce), while the acceptance and penetration of e-commerce and e-business is still in its infant stages in the developing countries (Cloete et al, 2002; World Bank, 2006). There are various factors contributing to the slow adoption of ICT by these SMMEs. The small organisations do not have enough funding to invest in the ICT infrastructure. Another reason is that SMME owners / management are not well informed about the benefits of implementing ICT based business and thus, take a lax attitude towards ICT (Cloete et al, 2002; Chandra et al, 2001).

The external business environment is not friendly in nurturing the SMMEs. They operate under stringent regulations, high inflation rates and exorbitant interest rates on financial loans (Clarke et al. 2006; Rogerson, 1999). Such challenges make it difficult for them to invest in ICT enabled business. An awareness of the SMME owner or management about ICT benefits, an increase in policies, regulations and financial support will help overcome these challenges. This research highlights the benefits of implementing usable and positive UX appealing SAA in the sustainability of these SMMEs.

The advantages of automating any business process far outweigh manual processing. Advantages that accrue from computerising business activities include (King Research, 2008):

- Faster and efficient capturing and processing of business transactions and information;
- Cost cutting on stationary by automatic generation and filling of documents such as invoices, cheques and statement of accounts;
- Producing timely information;
- Versatility usage of information generated for management to make decisions;
- Fewer processing errors.

The characteristics of typical SAAs used in SMMEs in developing countries are discussed next.

2.2. Accounting tools

A definition of an SMME has been presented and the generic challenges that impact on SMMEs were detailed. This section outlines the aspects which contribute to answering the research question "*What are the typical SMME accounting business processes in the business environment of developing countries?"*

Accounting is an activity which almost every entity, ranging from individuals to large business enterprises, use regularly. Depending on the individuals or the size of the organisation, accounting activities can range from household budgets, cheque book reconciliations and recording revenue and expenses, to the preparation of tax returns and financial statements. At the enterprise level, accounting is defined as the art of recording, measuring, summarising, analysing, interpreting and communicating financial activities (Meigs and Meigs, 1981). SMMEs in developing countries derive their success and sustainability by implementing affordable and yet effective SAA to support their business accounting systems. A SAA is a specialised application used to record, analyse, interpret and report the business transactions of a financial nature (Meigs & Meigs 1981).

Record keeping is the foundational basis of all accounting activities. Financial activities that are to be summarised, analysed for interpretation and communication must be properly recorded in the correct ledgers and transactional categories. It is important to record and keep documentation of all entries that give rise to a transaction. These transactions to be recorded include revenue and expenditures. Organisational transaction recording reaches beyond the capturing of daily sales or purchases and involves the detailed levels of the recording and

preparation of orders, managing cash flow activities, annual stock-take records and detailed records of suppliers and regular customers.

The recorded information is consolidated, categorised and summarised according to its transaction nature.

Generally there are two spheres of accounting, namely (Faul, et al, 1997):

- *Financial Accounting* which provides external users with financial information. The external parties comprise of investors, labour unions, government regulatory agencies and the general public. These parties are more interested in information regarding the business financial position and results of its activities.
- *Management accounting* is responsible for communicating managerial data and reports for the benefit of the internal users. It reports on information about specific aspects of the business activities like cost of production and cash flow controls.

Accounting is a "language", according to Meigs and Meigs (1981), used to communicate to various entities within the business and to external parties. It, therefore, becomes vital to have applications with robust and usable UIs to support the accounting system. SMMEs need to have usable accounting tools with appealing UIs to record their transactions to sustain them and help them compete in the global market-place. The recording of accounting transactions can be performed in many ways, including any of the following:

- Manual (writing in pen and paper);
- Automated (using spreadsheets and or word processors);
- Automated (using a commercial accounting application package for example Pastel);
- A combination of the above methods.

Automation by definition is "the use of computers to control a particular process in order to increase reliability and efficiency ..." (investorwords.com; 2008). Automation has brought significant benefits to the business world which impact on improving the performance of the organisation by increasing the effectiveness of its processes through the use of available information technology resources (Fairhead, 1990). Automated systems ensure that all data of importance to an enterprise is properly classified, categorized, and stored in a repository and is available when needed by the users. Automation can be defined best in terms of what

is achievable and its scope of use (Fairhead, 1990). Thus, when selecting an accounting system, the following aspects have to be considered:

- The needs of the business;
- The size of the organisation;
- The type of transactions to be recorded;
- The cost of implementing and maintaining the system;
- The anticipated benefits from implementing the system.

There are a wide variety of automated accounting software products available. The choice of suitable software depends on the nature and the size of the business. Small organisations need accounting packages with entry-level accounting functionalities. The tools have to be affordable both to purchase and maintain, easy to use and meeting the expectations of the user. The applications are expected to appeal to a positive user experience during and after using the tool to perform specified goals in a specific context of use.

A questionnaire-based survey was conducted to gain knowledge about the nature of accounting business activities for the SMMEs. The next section outlines a description of the survey.

2.3. Pilot study description

A preliminary survey was conducted during the period July 2008 to October 2008. Its purpose is to investigate the nature of the accounting business activities and the profiles for SMMEs SAAs users. The survey targeted participants in the SMMEs operating developing countries. A questionnaire was employed as the data gathering technique. The questionnaire has the following three categories:

- Organisational details of the participant;
- Biographical information of the participant;
- Attitude of the participant towards computer use.

The questionnaire was administered both online and by distributing hard copies.

The organisational details section aimed at gathering information on size of the organisation, how it supports its accounting system and what type of business accounting transactions are recorded. *(See appendix A for the pilot study questionnaire).* The participants were asked to

indicate if they would participate in an UI evaluation exercise. Those interested were contacted to complete the UI evaluation exercise.

A total of 46 participants responded to the questionnaire. 33 participants responded to the online questionnaire while 13 responses completed the hard copy questionnaire. All the participants belonged to organisations falling within SMME category based on head count with the majority of them, 20 out of the 46, (43%) located in the Eastern Cape province in South Africa. An outline summary of the pilot study results is detailed next. (*See Appendix B for the detailed presentation of the pilot study results*).

2.3.1. Organisational data

All 46 participants indicated that their organisation has some form of accounting and book-keep system which tracks their financial business activities. 28 participants (61%) use automated commercial accounting packages, of which four, (9%) use spreadsheets, while six (13%) use a combination of system (automated commercial packages, spreadsheet or manual system), while another eight (17%) use a traditional manual accounting system. The majority, 87%, operate as registered entities while 13% did not indicate their legal status. Of the commercial accounting packages used, Pastel accounting is the dominantly used SAA at 59% to support the SMME activities. The following accounting activities are most common based on the responses.

- Inventory control;
- Preparation of financial statements;
- Supplier documents processing;
- Customer documents processing;
- Cash book management.

2.3.2. Biographical data

The pilot study findings indicate that females (65%) dominate the users in the SMMEs accounting sector compared to males (35%). Most of the SMME user profiles are in the Age Group 41 years and above, at 41%, followed by the 25-29 years Age Group at 26% and an equal representation of the 40-44 years Age Group and 30 – 34 years Age Group both at 11%, while 9% of the participants are between 35-39 years Age Group and only 2% are between 19-24 years old. The majority of the participants (67%) are of English origin. Most

of the participants (65%) are holders of at least an undergraduate degree, diploma or certificate from a tertiary institute and use computers almost on a daily basis. 87% of the participants indicated they had formal training in accounting with the majority of these (61%) obtaining the training from university / tertiary college, while 35% indicated they had training at work and 4% at secondary education level. Most of the participants, 80%, indicated they are familiar with Pastel accounting and use it on a daily basis.

It is an understanding of such profiles of the users that helps the designers in tailoring their designs to suit the needs of the users or intended users of the applications.

2.3.3. Attitudes towards computer use

Most participants indicated that they are comfortable with using any computer application. They have a positive attitude to learning about and using computers. To a greater extent, they understand the benefits of computerisation and have the belief that computer applications can make them more productive, efficient and effective in performing their tasks.

2.4. Preliminary survey results

This section presents selected preliminary survey results illustrating the nature of the SMME accounting system, the SAAs to support these and the common accounting business processes of the SMMEs.

Figure 2.1 illustrates the responses of the participants to questionnaire item Q1-6. It enquired as to how the organisation records and tracks its financial business transactions.

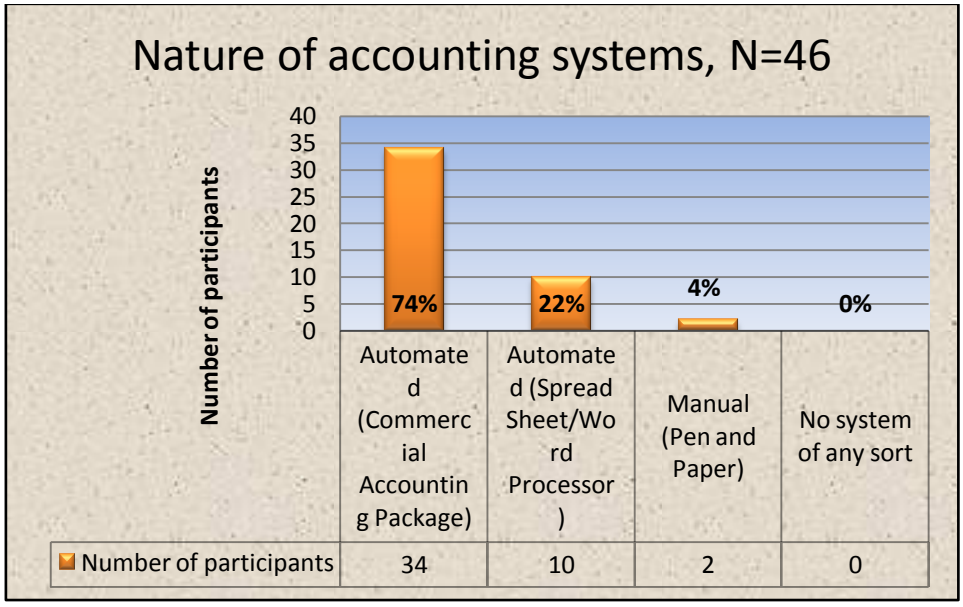


Figure 2.1: Nature of accounting system

As depicted is Figure 2.1, the majority (74%) of the respondents use commercial automated accounting packages. 22% use spreadsheet and word processors while only 4% still use the traditional manual method. It is interesting to note that all the participants had some form of accounting record keeping in place.

Figure 2.2 illustrates the results for the automated accounting tools used to support the accounting system. Pastel accounting has the highest number of users (59%), followed by QuickBooks (12%). Other packages came as minorities (Automate, Omni and econo-accounting). Thus, Pastel accounting is the dominantly used accounting package. The findings justified selecting Pastel as a case for investigating its UI factors that impact on UX.

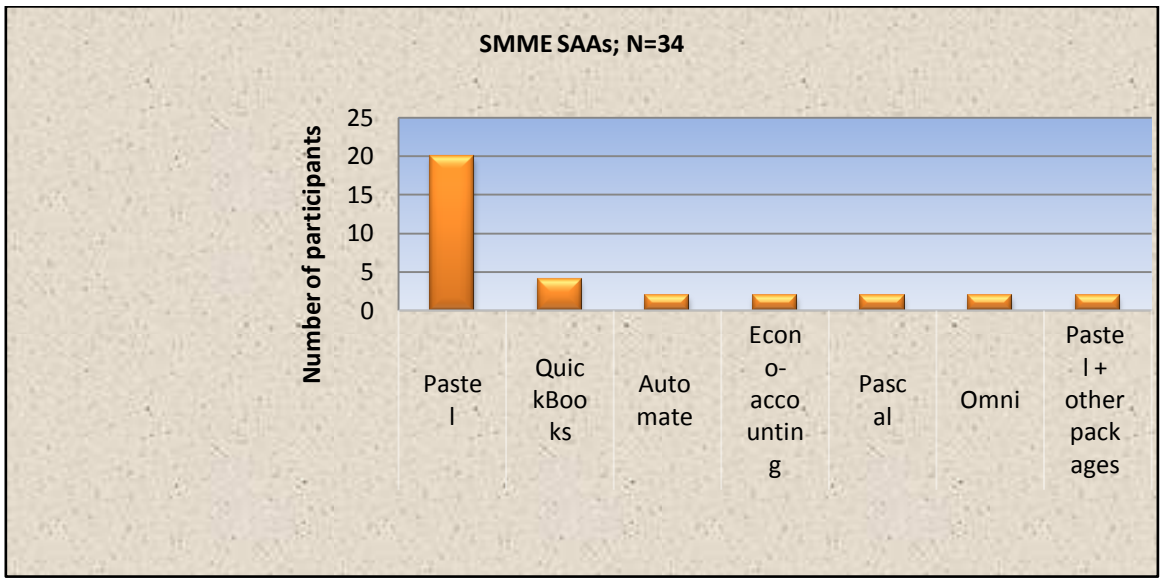


Figure 2.2: SMME SAAs

Inventory control, accounts payable and accounts receivable are the prevalent SMME accounting business process. The companies keep customer and supplier documents like invoices, orders quotations, debit and credit notes. All the participants indicated that their organisations use the cash book to record revenue and expenses and manage their bank account balances. Another common SMME accounting activity is the preparation of financial statements such as the balance sheet and income statement.

The following section presents a discussion on the generic problems faced by the SMMEs in implementing and using accounting tools.

2.5. Accounting tools problems

There are dozens of software solutions available ranging from those that support entry level accounting needs to ERP applications. Many application developers have realised the growing need for SAAs. Various improved versions of the same products are being released. The improvements include the functionality of the application tools and usability aspects. Product designers are shifting their focus to developing products which are usable and easy to use. This is witnessed in cell phone, SAA and websites improvements (Morville, 2002). These developments are rife but there still exist considerable problems that hinder the acceptance and implementation of these software tools especially in the SMMEs in developing countries. In this section, the problems associated with the adoption and usage of SAAs are examined. This study relates to problems specific to SMMEs operating in a typical developing country environment.

At the time of this research, no specific study that outlines the precise problems of SAAs was available. Literature is available on ERP problems; therefore inference is made and applied to the problems of SMME specific SAAs. Some of the problems encountered with ERPs include the costs of the software, technical incompatibilities and usability problems (Gilbert, 2003)

Cost related problems faced by SMMEs in implementing accounting packages include the purchasing costs, installation cost, maintenance costs and training costs (Chiware & Dick, 2007; SME Survey, 2006). The following authors suggest solutions to the problems. The developers of the SAAs should design applications which are easy to use, intuitive and cheap to maintain (Stefani et al, 2005; Procter & Williams, 1996; Chiware & Dick, 2007). Business application tools ought to be flexible, scalable and extensible to meet new requirements of the organisation to service extension and organisation growth (Li et al, 2007).

Technical incompatibility problems arise when the accounting application fails to run on the current software operating platform which requires the SMMEs to invest in IT infrastructure upgrade.

Another problem is the usability of the software applications. Most of the applications fail on the usability aspects and do not promote a positive UX. The tools are difficulty for first time users to learn; they are not easy to use and are not user friendly (Doost, 1999; Lombardo & Condic, 2000).

2.6. Summary

Chapter 2 highlighted the importance of SMMEs to any economy. The typical business environment characteristics of the SMMEs, its advantages and challenges were discussed. It has become imperative that the advantages of computerisation of the SMME business activities and the benefits towards their growth and sustainability are not undermined. The generic problems associated with use of a computer-based system in supporting business activities were presented. The failure of computer applications to cultivate a positive UX and their low usability are rated as major problems that inhibit these applications from delivering their potential benefits. Most of their shortcomings are attributed to the failure to satisfy user experience and their difficulty to use and learn. The need of robust usable software is of core significance for the success of the small business.

It is important that the SMMEs implement robust software with appealing and usable user interfaces. When considering the agility of emerging economies business environment, and the stiff competition for resources among organisation globally. A robust design ensures that the organisations benefit from the implementation of the software application. Chapter 3 addresses the UX issues of accounting tools specifically designed to be used in the developing countries environment.

CHAPTER 3: SMME ACCOUNTING TOOLS USER EXPERIENCE

3. Introduction

The purpose of this chapter is to establish the appropriate criteria for elevating the usability and UX of SMME-specific SAAs. The chapter focuses on research question 2:

"*How can the UX of an accounting tool be evaluated?"*

Existing UX evaluation methods and criteria are examined to establish both the appropriate and applicable means for evaluating the UI factors that impact the UX of a selected SAA. The chapter commences with a discussion of the user interface and user experience. Thereafter, a working definition of UX, to be employed in this research, is derived from existing UX definitions. The importance and the components of UX are discussed. The existing UX evaluation methods are presented and a discussion on SMME SAAs UX is presented.

3.1. UI and UX

User interface designing and UX are important aspects of the design of interactive systems. The UI of a product is a critical feature in Human Computer Interaction (HCI). The end-users of a software application tool usually judge the whole system by its user interface (Scholtz, 2006). Thus, the acceptance of the system and its success or failure is largely determined by its UI as perceived by the end user. Therefore, it is important that the software developers should consider UI design directions for the intended users of their products.

The challenge facing application developers is to develop UIs that help users locate information easily, are easy to learn and are satisfying within a context of use (Scholtz, 2006). An unsatisfactory UI can result in users having difficulties in finding the information and functionalities they need. In most cases, users find applications that are not familiar with their expectations or preconceptions and they encounter navigation difficulties. This hinders them from effectively and efficiently interacting with the applications satisfactorily to complete their intended tasks. A poorly designed interface creates confusion, frustration and difficulties in learning how to use the system. It makes the users fail to understand what the system is supposed to accomplish or what he or she is expected to do to complete a task. This substantially distracts the users from what they want to do with the application and an overall positive UX.

A good user interface has a vast impact on the experiences of the users interacting with the system (Roy et al, 2001; Constantine, 2006). Humans are rational beings and experience different subjective emotions when exposed to a variety of circumstances. A well-designed UI increases the experience and pleasure of the user in using the tool. It matches their expectations, reduces frustrations and errors while performing tasks. Since the users know how to use the application, their interaction with the system increases efficiency, effectiveness and user satisfaction. Design consistency makes it easy to learn, understand and memorise UI objects which promotes a positive UX. This, in turn, boosts productivity. Thus, it is realistic that a good UI design has a profound and positive impact on the UX of a product (Jih, 1989; Mauro, 2008).

It is the goal of this study to propose metrics to evaluate the UI factors that impact on the UX of a selected SAA that is commonly used to support SMME accounting activities.

3.2. Defining UX

User experience is an emerging discipline that is rapidly gaining acceptance in the HCI field but is still not well addressed or grasped by researchers and academia (Law et al, 2009). Several articles, presentations and conferences have been held relating to UX; however, no conclusive and conventionally accepted definition of UX has been devised (DUX, 2009; Law et al, 2006; Roto et al, 2008). Several authors have proposed a variety of aspects that define UX but these depend on the disciplinary viewpoint of the author. The variations in defining UX arise from of the multidisciplinary nature of UX. Designing for UX encompasses a variety of related aspects. Figure 3.1 illustrates the interrelations between the aspects defining the nature and scope of UX.

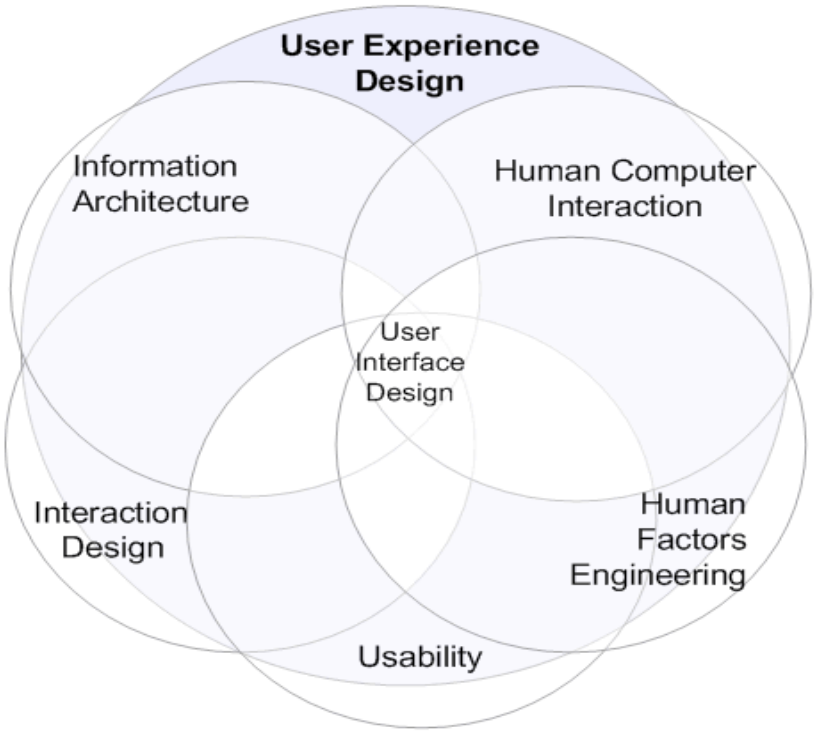


Figure 3.1: UX disciplines (Source: Hess, 2009)

At the heart of UX designing is UI designing which is related to Information Architecture, Interaction Designing, Usability, Human Factors Engineering and HCI. A definition of UX requires incorporating all its inter-related aspects. Table 3.1 tabulates its definitions as postulated by various authors.

Table 3.1: UX definitions

Author(s)	UX Definition
Desmet and Hekkert (2007)	The entire set of aesthetic and emotional experiences elicited by the interaction between a user and a product.
Sward and MacArthur (2007).	The value derived from interaction(s) [or anticipated interaction(s)] with a product or service its context of use.
www.uxnet.org (2009)	The quality of experience a person has when interacting with a specific design.
www.nngroup.com (2008)	All aspects of the interaction of a user with a service and its products in a specific environment of product use.
Hassenzahl and Tractinsky (2006)	A consequence of an internal state of the user, the characteristics of the designed system and the context within which the interaction occurs.
Wikipedia	The overarching experience a person has as a result of their interactions with a particular product or service based on its design.
Sharp et al (2007)	Aspects of the subjective perceptions of a user on how the interaction with the system feels rather than the usefulness of a system.
ISO (2008)	Perceptions and responses of the user that result from the use or anticipated use of a product.

The following aspects appear to be common to the definition of UX:

Interaction / use;

In defining UX it is essential to understand that it also comprises of the following series of interactions: *passive interaction*, *active interaction* and *secondary interaction* (Reiss, 2009).

User / person;

The *user / person* refer to the entity (individual or social group) interacting with the product. The *product or system* is the object being manipulated by the user / person.

Product / system;

The product refers to the application or device under examination which the people interact with.

Subjective experience / emotion

The *subjective experience* relates to the overall individual / social group opinions, emotions and feeling a user has of her / his interaction with a product Experience can be derived

during interaction with the product and or anticipated interaction (ISO, 2008; Sward & MacArthur, 2007).

In this research the UX definition and facets are extended to incorporate the context in which the product / system is used and the specific goal(s) a user needs to accomplish from interacting with the system. Thus, UX is defined as *the overall subjective specific individual / group emotions, feelings and attitudes arising before, during and or after a user interaction with a product to perform a specific task in a specified context.*

The importance of UX is discussed in the next section.

3.3. Importance and goals UX

Over the past years, software developers have been competing to make their products provide the best functionalities to their users. The business environment became clogged with applications performing similar functionality. This lead to the developers releasing improved versions to outdo the competitors and expand their customer base. Pastel accounting has developed business specific applications to meeting the needs of the organisations. Pastel evolution versions support accounting needs for large organisations while the Partner version is geared towards medium sized organisations and the Xpress version suits the entry-level, accounting needs of small organisations. Although within these applications Pastel developers have released upgrades for their products, for example Xpress 2007 and Xpress 2009. The versions have similar functionalities but with minor differences in the UI designs and in compatibility with the operating platforms.

This increasing competition for improvement means that it is important for the developers to bring user needs and human factors to the centre of their designs. Their aim is to develop systems with collaborative and interactive UIs which are satisfying, enjoyable, entertaining, emotionally fulfilling and motivating to use (Sharp et al, 2007). Users expect to harness the best experience when interacting with any system. They expect their computer applications to be user friendly, aesthetically pleasing, familiar, predictable, fun, enjoyable and productively useful within a specific context of use (Microsoft, 1999). These descriptive subjective terms are the goals of UX. It is imperative that the developers aim at the goal of creating such an experience in the users or potential users of their applications from the initial stages of product development.

User experience is, therefore, of significant consideration because end-users are becoming aware about their investments in software tools. Users expect to harness the full benefits and

value from the product in terms of productivity enhancements and ergonomic user satisfaction and overall experience. Aiming towards positive UX, from the initial stages of software development, reduces product life, reengineering costs and marketing resources to make the consumers aware of the products. Developing for UX retains existing product users and attracts more customers to use the application.

3.4. UX building blocks and facets

Figure 3.1 depicts the various fields encompassed by UX. A definition for UX was proposed in Section 3.1, therefore, the goal of this section is to discuss the components that stand as pillars of the UX of a product. Defining such UX components guides the process of UX design and ensures precision in evaluating UX. Drawing inference from the postulated UX definition, the UX is made of up three building blocks. These are *user*, *system* and the *context of product use*.

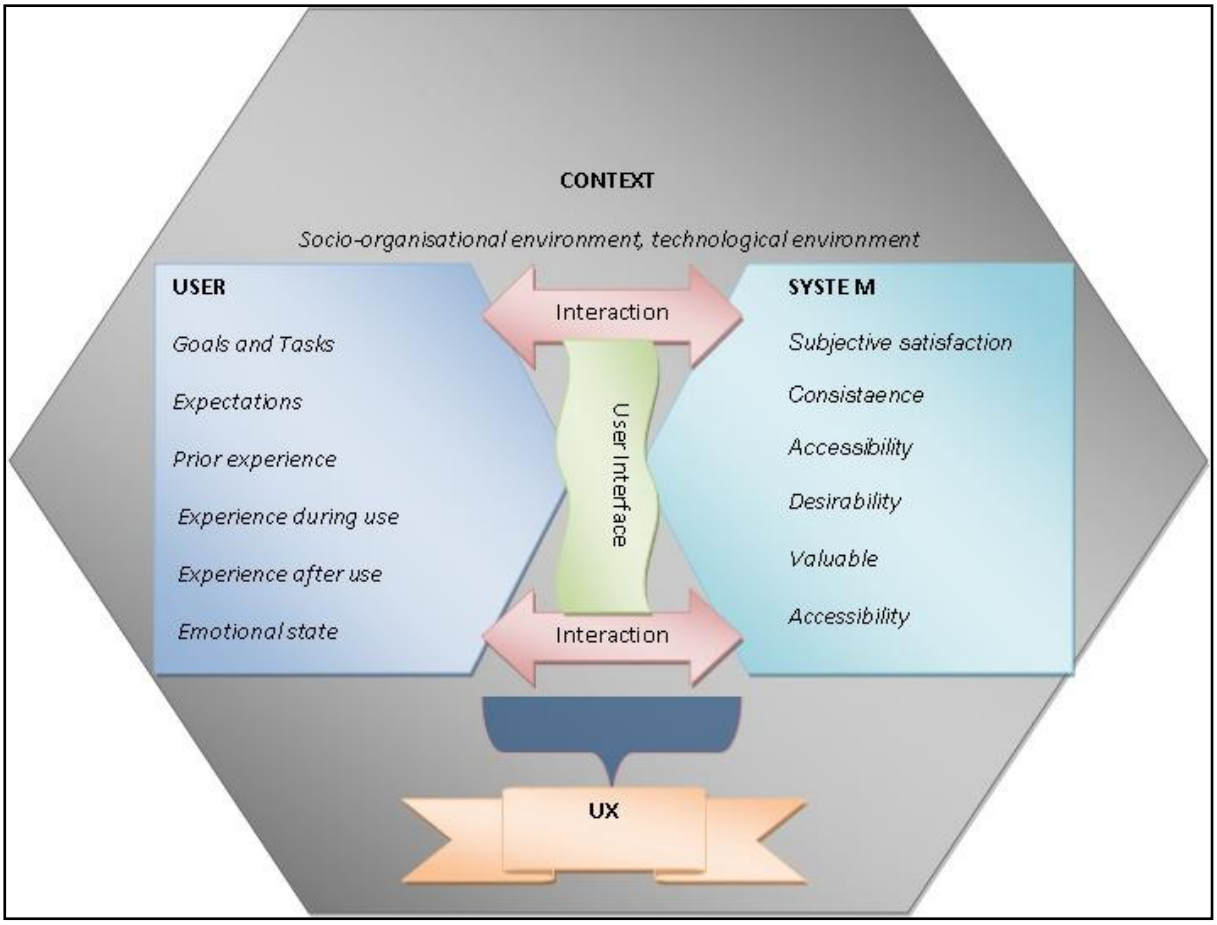


Figure 3.2: UX building blocks and facets (adapted from Roto, 2006)

Figure 3.2 depicts the building blocks of UX. The three components and their attributes summarise the UX constructs for a product. It is relevant to note that the proposed list of

attributes in each building block element is not complete. A variety of other attributes can be added, depending on the product under discussion and its use.

3.4.1. Context

The context refers to the surrounding environment in which the tool is used. Context consists of the socio-organisational and technological environment in which the tool is used. These environments, while not directly related to the UI element, impact on the overall UX. Social acceptance of a product and its technological operating platform shape how users will perceive it and its overall UX. An example of technological aspects includes the type of hardware and other software the users are accustomed to. It is, therefore, important that a product is developed to suit its context of use, the social and technological aspects, for it to be accepted and to promote positive UX. The context goes beyond the physical and technological aspects, it equally comprises of the business values and objectives (Hess, 2009).

3.4.2. System

The system is the product which the users interact with, which leads to some experience. The interaction can be passive, active or secondary, as discussed in Section 3.1. System attributes include its functionalities, scalability and sustainability. A study of all the various system elements is beyond the scope of this research. This research focuses on the UI of the system. Pastel accounting UI factors which impact on UX are investigated and evaluated. A system with a well-designed UI, which is clear, aesthetically pleasing, enhances a positive UX. Figure 3.3 illustrates the UX facets as defined by Morville (2004)

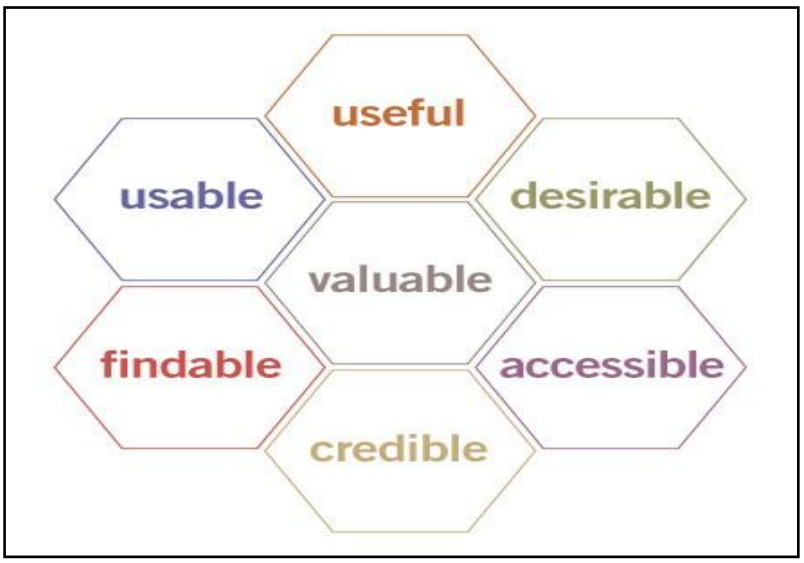


Figure 3.3: UX facets honeycomb (source: Morville, 2004)

The UX facets honeycomb defines the overall attributes that promote the positive UX of a product. At their core is that a product must be valuable. Users of any system always want to experience that they are benefiting from their interaction with the product. The system has to be useful and fit to deliver value to the users. A system has to satisfy the specific needs of the users within the specified context of application use. A system user interface which is credible, increases the users trust and confidence in interacting with the system. According to Banati et al (2006), a system with a usable UI leads to users trusting the system, trust which in return improves the usability of the product. Another honeycomb facet that enhances the positive experience is that a tool must be usable. It has to be easy to use, and intuitive for first time users. While performing tasks, users need to have pleasure in interacting with a system which is both easy to use and intuitive. The power of a tool is in the quality of results it delivers and in its ease of use. A product which is easy to access and find information brings joy to the users. Thus, a product designed for accessibility and ease of finding information will undoubtedly be accepted by the users. Users will enjoy their interaction with an application that is easy to find and access its information and functionalities. Designing a product for desirability is important to enhance successful positive UX. Experience in interacting with a system is enhanced by the visual and aesthetic design of the UI of a product. An aesthetically pleasing UX creates addiction in the users and captivates users to continue using it.

3.4.3. Users

The third UX building block is the user of the application. Users experience in interacting with a system is mainly due to their expectations, prior experience with the product, preconceptions, emotions during application use and overall feeling after they have interacted with the product. It is such experiences and expectations that affect the overall experience felt by the users of their interaction with the system (Roto, 2006). Users interact with a system with personal, emotional and rational needs and wants (Hess, 2009). They always attach some level of perceived ease of product use and usefulness, at times before they even interact with it. If their interaction with the system fails to reach the perceived expectations, the users will get frustrated and their hopes for a satisfactory experience are shattered.

For designers to develop products appealing for positive UX, they have to thoroughly consider the UX building blocks (*user, system and context)* to develop products that appeal to a positive UX.

3.5. UX evaluating methods

Software products development focus is gradually shifting from designing usable products with complex functionality and extending to designing usable functional systems appealing to user experiences (Nokia, 2005). UX is a multidimensional discipline with complex and intertwined facets that are affected by the users, the context and the system. An understanding of needs of the users, their preferences, their goals and the context in which the product is used, is vital in evaluating the UX of a product. Usability and UX, like any other indicators of organisational performance such as revenue growth, need to be measured, quantified and evaluated (Sauro & Kindlund, 2005). In this research the measures for quantifying the quality of UX and the usability of a product are called metrics (Tullis & Albert, 2008). UX metrics are quantitative indices that measure some facet or dimension of a UI impact on overall UX and usability. Examples of metrics include learnability, user satisfaction, efficiency, effectiveness and many others (Tullis & Albert, 2008). The purpose of this research is to propose the metrics for evaluating the UI factors that impact on the UX of a selected SAA commonly used to support SMME business accounting activities. Prior to proposing the metrics it is important to examine the existing UX evaluation methods.

There are several methods which measure the emotions of the users, their satisfaction and subjective ratings of their interaction with a product (Bevan, 2008). The underlying purpose of evaluating UX is, to understand those system aspects which users find to work well and those they find frustrating to their interaction with the system. Obtaining such information gives the designers feedback to improve the user experience. Due to the interdisciplinary and complex nature of UX, measuring it is not an easy task. The evaluation criteria dissect the various facets incorporated in UX. The measuring criteria have to address the subjective, hedonic and pragmatic aspects of users' interaction (Hassenzahl, 2003). The requirements and purpose of the evaluation and the metrics which are employed to measure UX must be specified prior to attempting to evaluate UX (Toshihiro, 2008). The methods can be classified into the following three categories, *user testing methods, inquiry methods and inspection methods* (Banati et. al, 2006; Rubin & Chisnell, 2008; Usabilityhome, n.d). The choice of evaluation criteria depends on a number of factors including the following (Roto et. al, 2009):

- The stage at which the product is at in its development life cycle (either early project planning, non-functional prototypes, functional prototypes or ready products);
- The purpose of the evaluation (performance evaluation or preference evaluation);

- Aspect(s) of the system being evaluated (whole system or part of it for example evaluating the UI).

3.5.1. Inspection methods

Inspection methods involve independent expert(s) who review the product with the goal of identifying hindrances to positive interaction experiences. The experts can be usability specialists and / or experienced users of the product. The chosen specialist has to be knowledgeable about the domain in which the product is used and / or about usability and UX evaluation. A "double" expert, according to Rubin and Chisnell (2008), is one who has expert skills in both usability evaluation and the domain which the product is used and has an added advantage in the evaluation. Inspection methods include:

Heuristic evaluations

Heuristic evaluation is an inspection method whereby the expert evaluates the product design against any violations of a given set of design principles and guidelines (heuristics) (Nielsen 1994; Sharp et. al. 2007).

Expert reviews

Expert reviews involve an expert examining the system for user interface hurdles that may potentially impede users from positive experience during interaction with the system (Six, 2009; Nielsen, 1993).

Cognitive walkthroughs

In the cognitive walkthroughs method an expert or group of experts exploring task performance paths with the intention of finding aspects of the user interface trapping the users and that maybe misleading and likely to be misunderstood to users (Wharton et. al., 1994). In most cases cognitive walkthrough method is used for evaluating products in their design stage of development.

Feature inspection

The feature inspection method aims at having evaluators focusing on a specific aspect (feature / functionality) which is part of the product *(Usabilityhome, n.d).*

The results of expert based inspection methods include the following (Bevan, 2008):

- A report on UI violations of the guidelines and principles set as the evaluation heuristics;
- Number of issues identified that hinder a good experience when interacting with the software application;
- Amount of UI elements designed in accordance to the set of heuristics.

Inspection methods can be used to evaluate UX at any stage of the System Development Life Cycle (SDLC).

3.5.2. User testing methods

User testing methods provide direct data on their performance during their interaction with the system. The method involves presenting a sample of users (participants) with a structured set of tasks and directly observing their experiences and behaviour resulting from their interaction with the system. This criteria uses performance-based parameters to quantify usability and user experience qualities of a software application (Nielsen, 1993). Quantifiable, direct and pragmatic UX measures include measuring any of the following performance aspects (Nielsen, 1993):

- The time taken to complete a task;
- The number of tasks completed within a time limit;
- The ratio of successful to unsuccessful interactions;
- The number of user errors;
- The frequency of the use of manuals and the time spent using them;
- The number of times the user expresses joy or frustration.

In addition to the pragmatic measures, hedonic UX attributes can be obtained during user testing. Pragmatic aspects address the practical needs of the user, for example printing a document, while the hedonic aspects go beyond performance satisfaction. The hedonic aspects are the subjective experiences of the user derived from using the system. Examples of hedonic goals include evocation, pleasure and liking "be" feelings of the users (Bevan, 2008; Carver & Scheier, 1998; Hassenzahl & Roto, 2007). Designing to fulfil the hedonic "be" goals is paramount to archiving positive user experience (Nurkka, n.d). UX hedonic aspects can be obtained from context enquiry and ethnographic observations. Techniques like the "think aloud technique" (Denning et al, 1990), gesture and facial expression analysis, eye

tracking and mouse movement path analysis (Rubin & Chisnell, 2008) can be used to obtain the subjective hedonic experiences.

3.5.3. Inquiry methods

User inquiry methods are indirect criteria for evaluating the subjective user rating of their interaction with a product (Daniels et al, 2007). The users of the product are asked about their preferences, likes, dislikes and expectations of the product. The data collecting techniques include questionnaires, interviews and observing the users as they interact with the system. Questionnaires like the Questionnaire for User Interface Satisfaction (QUIS) (Shneiderman, 1998) and Perceived Usefulness, Perceived Ease of Use (Davis, 1989) are useful in post-test UX evaluation to measure user opinions on their satisfaction and / or frustration resulting from interaction with the system. Interviews are useful techniques to ask users to comment and give feedback on their experiences.

3.6. Small Medium and Micro Enterprises Software Accounting Applications UX

The goal of this research is to propose metrics for evaluating the UI factors that impact on the UX of a chosen SAA, commonly used to support accounting the activities in SMMEs. In Chapter 2, the characteristics of SMMEs in developing countries were discussed. The need for the small organisation to implement robust software tools to sustain them in the dynamic business environment which calls for agility to enable the organisation to survive where emphasised. Usability issues and difficulties related to the use of the accounting tools were discussed in Chapter 2.

It was found during literature study that most application tools fall short on usability issues and fail to appeal to a positive user experience (Launder, 1995; Gilbert, 2003). At times, users find the different system parts work differently to their expectations and require different types of interaction (Mathews, 2008). Users become frustrated, confused and not confident of their interaction with the applications. Such usability and interaction problems results in a poor UX. This results in the users lacking trust in the usefulness and value of the system in accomplishing their goals. These findings motivated this research.

This research aims at finding the UI features of the SAA that impede users from a positive interaction experience with the system. The study examines aspects of the UI of the application which the users find unsatisfactory and those they find satisfactory to interact with. The findings of the study are expected to improve the ease of use, user friendliness and the overall UX of the SAA.

3.7. Summary

Measuring UX is important when investigating what the users feel about the product they interact with. It is a means of quantifying their experiences which result from interacting with a product. The usability and UX of a product is an important aspect of business investment worth measuring as with any other variable. The overall effectiveness of a tool delivering its full potential benefit is based on whether the users perceive it to be both useful and usable. The first impression is derived from the UI of the application. Thus, the UI of the SAA has to be designed to ensure a captivating and lasting positive experience for both experienced and first time users. Useful and usable UX evaluation metrics need to be implemented for effective evaluation to obtain credible results.

In the next chapter, a choice of the UX evaluation metrics is made. A set of metrics applicable for the evaluation of a typical SMME accounting tool used in developing country environment is proposed.

CHAPTER 4: PROPOSED USER EXPERIENCE EVALUATION METRICS

4. Introduction

The purpose of this chapter is to discuss the metrics proposed for evaluating the UI factors that impact on a selected SAA user experience. It outlines the existing UX evaluation metrics which lead to the proposed metrics. The findings from Chapter 2 and Chapter 3 form the theoretical basis for the establishment of the metrics. The proposed metrics are to be used to evaluate a selected accounting tool. Section 4.1 presents an outline of existing UX evaluation metrics. Section 4.2 explains the UI factors to be evaluated in the summative study. The proposed metrics are discussed in Section 4.3. The applicability of the proposed metrics will be confirmed based on the evaluation findings.

4.1. Existing metrics

The multifaceted nature of UX, as discussed in Chapter 3, has resulted in various means of evaluation. Several authors have recommended various metrics for evaluating UX or some facet of it (Rubinoff, 2004; Kieschnick, 2008; Goddard, 2009; Nielsen, 1994; Banati et. al, 2006; Pretorius, Calitz and van Greunen, 2005).

The choice of which metrics to implement, depends on the purpose of the evaluation and how the results are to be used (Tullis & Albert, 2008). An evaluation can be for formative or summative purposes (Tullis & Albert, 2008).

4.1.1. Summative usability

A summative usability study is done on fully developed products. Its purpose is to evaluate the extent to which the product is usable and to measure whether the desired UX is achieved or not.

4.1.2. Formative usability

Formative evaluations aim at improving the products UX and usability while it is being developed. The evaluation metrics aim at identifying aspects which can potentially distract from the attainment of a positive UX.

Metrics for evaluating UX and usability as an asset of UX are discussed in this chapter. The literature review revealed the following UX and usability evaluation metrics as proposed by a variety of authors. Table 4.1 tabulates metrics which are common and similar amongst the authors.

Table 4.1: UX evaluation metrics

	Authors						
Metric	Goddard (2009)	Kieschnick (2008)	Nielsen (1994)	Pretorius, Calitz & Van Greunen (2005)	Rubinoff (2004)	Scholtz & Wesson (2008)	de Kock van Biljon & Pretorius, (2009)
Error tolerance: The system must help to prevent, diagnose and correct errors		√	√	√	√		√
Software-user Interaction: During application use the system must keep the user informed of its state	√		√		√		√
System-real world match: Does the system match the mental models and expectations of the users.			√				√
Help: The system must have a clearly labelled and help function which is easy to use	√	√	√		√		√
Satisfaction: The users must be satisfied of their interaction with the product	√	√	√	√	√		√
Visual design and aesthetics: A systems UI must be attractive to the users		√	√	√	√		√
Constance: The design of the application must be consistent and must follow the conventional design requirements.			√				√
Navigation: Users should get to the parts of the system they want to be without facing hindrances	√		√	√	√		√
Usability : A system must be easy to use with effectiveness, efficiency and satisfaction in performing intended goals			√	√	√		
Value and usefulness: Does the application match its expected value and usefulness	√	√		√	√		
Content: The content of the product must be structured in a way that facilitates the achievement of the goals of the users.	√			√			

Familiarity: UI elements (icons, terms and objects used) of the application should match the mental models of the user	√	√		√

The authors differed in their suggested metrics because they approach UX and usability from different dimensions and differed in their purpose for evaluation. Usability measurement falls into two dimensions namely *preference* measures *and performance* measures (Nielsen and Levy, 1994; Hertzum et.al., 2000). Preference metrics are used to assess the subjective rating of how the users liked the system while the performance metrics are objective based and measure the extent to which the users can successfully interact with the system to accomplish a specific goal (Tullis & Albert, 2008; Renaud & Biljon, 2008; Hertzum et.al, 2000)

4.2. User Interface factors

This research is a summative evaluation of the UI factors that impact on the UX of a selected SAA designed for use by SMMEs in developing countries. The following factors of the UI are evaluated.

4.2.1. Attractiveness

The visual aesthetics of the UI of a system determine the overall experience of interacting with it. The appearance of the UI of a product creates lasting emotions, expectations and user liking. Thus, the choice of colours and layout of elements on the UI of a system must be captivating, appealing and enhancing for a positive UX.

4.2.2. Consistence

A consistent UI makes it easy for users to learn the application with minimal memorability load from task to task. It enhances the understanding of the user of the application which in turn promotes a positive UX

4.2.3. Familiarity

A familiar UI matches the mental model of the user in the real world. The metaphors and icons used must resemble some real life objects within the context of application use of the user. Familiarity is brought by matching the system design with the background of the users in the domain of application use. An application that is familiar to the user creates passionate and happier interaction experiences.

4.2.4. Predictability

A predictable UI is one which does not bring surprises to its users. It matches the expectation of the user on the action they make. Such a design boosts the confidence of the user interacting with the product, thus improving on the UX.

4.2.5. System terminology

The terms, commands and labels used in an application should be related to the context which the product is used to promote a positive UX.

4.2.6. Subjective satisfaction

Overall, an application with a satisfactory UI design brings satisfaction in task performance, its perceived usefulness and ease of use, thereby, enhancing a positive UX

4.2.7. Control and freedom

The users of any application product want to have control over the application. They need to have diverse means of navigating and interacting with the system.

4.2.8. Feedback

A system with a UI providing appropriate and timely feedback promotes a positive UX, it does not leave the user wondering whether a specific task has been completed or not, it is always clear of its status during task performance.

4.2.9. Help

The UI of the application must provide help to the users so that they know how to perform a specific task, the purpose of a UI element and it must facilitate the users to explore the product.

4.2.10. Tolerance

An application which is lenient to its users when they make errors promotes a positive UI. The UI of the application must be designed so that users are not offended when they make a mistake. It must always provide warnings to the users when they are about to make a mistake and provide users with means of recovering from an error.

The purpose of this study is to propose metrics for evaluating the UI factors that impact on the UX of the selected accounting tool. The next section describes the proposed metrics.

4.3. Proposed metrics

The proposed metrics are adapted from the various authors and those applicable to this study are selected. The majority of the metrics proposed are based on Nielsen's usability heuristics. (1994) The UX of the SAA is determined by the subjective preferences of the users. The chosen measures are preference based and are not used to evaluate any objective performance-related aspects.

The metrics identified as most frequently cited by the different authors are examined in proposing the metrics to evaluate the UI factors that impact on the UX of the selected software tool. The metrics identified as common are juxtaposed to the theoretical findings of Chapter 2 and Chapter 3, to rate their applicability. The following metrics have been proposed and are discussed:

4.3.1. Subjective satisfaction

The metric quantifies the overall satisfaction of the users on the ease of completing a task and their pleasure or displeasure from interacting with the system. The metric has also been used by Nielsen (1994), and Pretorius et al, (2005).

4.3.2. Consistence

Consistence evaluates whether similar function keys are used to perform similar functions throughout the application. Keyboard shortcuts and commands should match the standard conventional design. The metric is adopted from Schneiderman (1998), Nielsen (1994) and de Kock et al (2009).

4.3.3. Attractiveness

Attractiveness measures the subjective opinion of the users on how they find the visual design of the product. The metric evaluate how the users find the product to be the appealing, pleasing and enjoyable visually. An attractive UI design promotes a positive UX. Contributing authors to this metric include: de Kock et al (2009), Nielsen (1994) and Rubinoff (2009).

4.3.4. Familiarity

Familiarity measures how the UI elements of the application matches the mental models of the user on their domain background and experience on other computer based applications. These authors postulated familiarity: Scholtz and Wesson (2008), and Goddard (2009).

4.3.5. Tolerance

The system should always give messages warning of possible errors. On error occurrence the system should give clear plain language error messages telling the users of the action he or she needs to do to rectify the error. A lenient system boots the confidence of the user and overall satisfaction. The metric is adopted from Kieschnick (2008), Nielsen (1994), Pretorius, Van Greunen and Calitz (2005), Rubinoff (2004) and de Kock et al, (2009).

4.3.6. System terminology

The metric evaluates how much of the UI objects (terms, labels and commands) of the product do the users find to be common to the context of its use. The system should avoid the use of computer jargon but language that is common to its domain of use. The metric has been used by Nielsen (1994) and Pierotti (2000).

4.3.7. Predictability

The metric evaluates how much the users find the system to behave in a manner which they always expect and predict. While interacting with the system, users should get results they predict and expect from their actions. The contributing authors include Scholtz and Wesson (2008) and Goddard (2009).

4.3.8. Feedback

Feedback measures the extent to which the users feel the application to be collaborative, communicative and informative of its state during task performance. The metric evaluates how much the system gives relevant messages on user action within reasonable time. Authors who have used this metric include Nielsen (1994).

4.3.9. Help

The metric evaluates the helpfulness of the help function of the tool. It provides a criterion for users to rate the accessibility of the helpline, how they perceive it to be useful and informative in telling them what they can do with the application, how to do a specific task, the function of a specific object and how to navigate the application. The contributing authors

to this metric are Goddard (2009), Nielsen (1994), Rubinoff (2004), Pretorius, Van Greunen and Calitz (2005) and de Kock et al (2009).

4.3.10. Control and freedom

The metric evaluates how much the user feel to be in control of their interaction with the system. It is concerned with the various navigation options available to the users. Control and freedom looks at whether users can interrupt the system while it is in progress. A system that places the user in control encourages users to enjoy using it. The metric is employed by de Kock et.al (2009), and Nielsen (1994).

4.4. Summary

Metrics proposed for evaluating the UI factors that impact on UX of the SAA are presented in this chapter. Most of the proposed metrics are adopted from Nielsen's heuristics. Extra metrics such as familiarity and predictability have been included to evaluate the stated UI factors. The proposed metrics can be used as benchmarks which the developers of the accounting tools will implement as guidelines to make the applications usable, user friendly and appealing for a positive UX.

CHAPTER 5: RESEARCH DESIGN and METHODOLOGY

5. Introduction

Human Computer Interaction (HCI) is still a developing field which incorporates multidisciplinary concepts and approaches (Carroll, 2009). It is a multifaceted field surrounded by aspects from various domains which include computer science, cognitive psychology, engineering, sociology, user-centred design and ergonomics (Rozanski & Haake, 2003). HCI deals with enhancing how human beings interact with computers. Figure 5.1 illustrates the fields surrounding HCI.

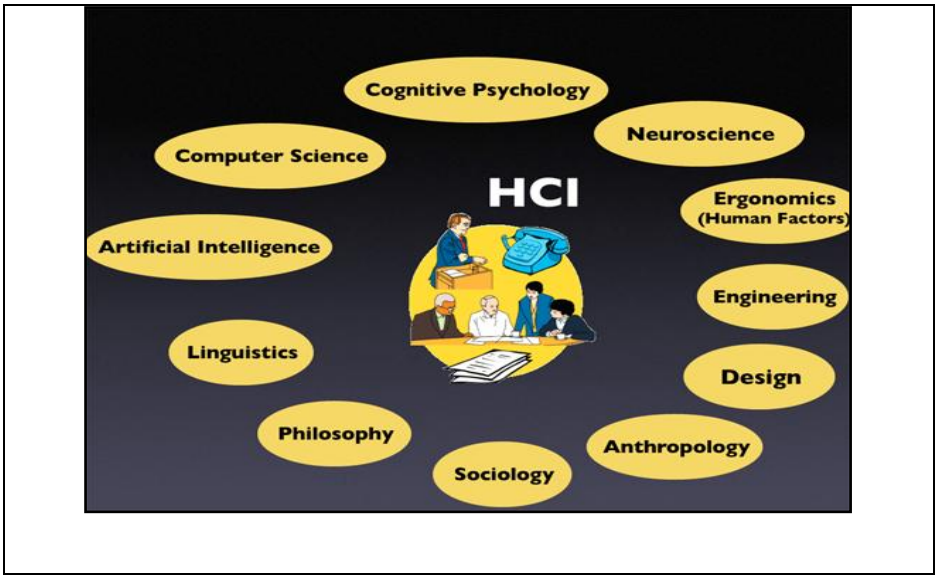


Figure 5.1: HCI fields. (Source: Richter, 2004)

The multidimensional nature of HCI requires an interdisciplinary research approach which transects the different disciplines. Research in this field has, as its goal, the exploration of how computers affect individuals, organizations, and society at large. It seeks to improve the design, use and implementation of usable interactive computer systems (Myers, 1998). The diversity of the field requires a variety of approaches to research so as to promote human-computer collaborative products.

This chapter presents a discussion on research disciplines of the HCI field. Section 5.2 highlights how these research disciplines can be integrated into the research process. This theoretical background forms the basis for the research design and methodology.

5.1. HCI research disciplines

5.1.1. Design science approach

The *Design Science* approach involves the creation of artefacts and artificial systems to reach a solution to a problem under investigation (Hevner et. al, 2004; Venable; 2006). Its rationale deals with how a product intends to function, how it can be modelled and evaluated through the creation of artefacts (Kuechler & Vaishnavi, 2008). It is through the "*build" and "evaluate*" processes, that the researcher acquires both knowledge and an understanding of the study domain and develops possible solutions to the problems (March & Smith, 1995). Artefacts have contributed significantly to development on new theories in HCI and in exploring user centred design and interaction design processes (Carroll & Kellogg, 1989).

5.1.2. Traditional science approach

In *Traditional Science* research, investigation is done by gathering observable, empirical and measurable evidence to which reasoning can be applied to reach a conclusion about the subject matter (Robson, 1993; Nachmias & Nachmias, 1992). Traditional science research is centred on examining how things are, based on observable facts, which we can see, hear and touch. The researcher collects data through observations and experiments, and by formulating and testing of hypotheses prior to empirical enquiry.

In HCI this approach produces knowledge which enables the researchers to draw deductive and inductive explanations about the empirical experimental findings. It allows for the relationships among the variables to be understood, predicted and if need be, controlled for improvement of the aspect being investigated.

5.1.3. Engineering Approach

This approach is predominantly used in software engineering. It encourages the observation of existing solutions with the intention of refining them into better solution proposals (Nishida, 2007; Sage, 1992). A set of applicable solutions will be measured, analysed and evaluated based on the proposal. The process is iterated until the product is ready for use and no further improvements are needed.

This approach emphasizes what people actually do or can do in practice, rather than what they ought to do in principle (Wood et.al, 1999). Researchers use case studies and prototypes to understand the domain of study. The engineering approach considers the social context and appreciates that not all problems in software engineering are solely technical. It identifies that

"people problems" call for "people oriented" solutions (Potts, 1993). Thus, it seeks to understand human-computer related problems and bring improvement to the way humans interact with devices.

5.2. The research process

Underlying research disciplines were introduced in Section 5. The purpose of this section is to describe how such research can be conducted in a systematic approach. A methodical approach to the research process helps to link the study design activities. An organised approach to research expects results of high credibility and relevance to solving the problem under study (Knox 2004).

Figure 5.2, illustrates the research processes proposed by Saunders et al, (2003).

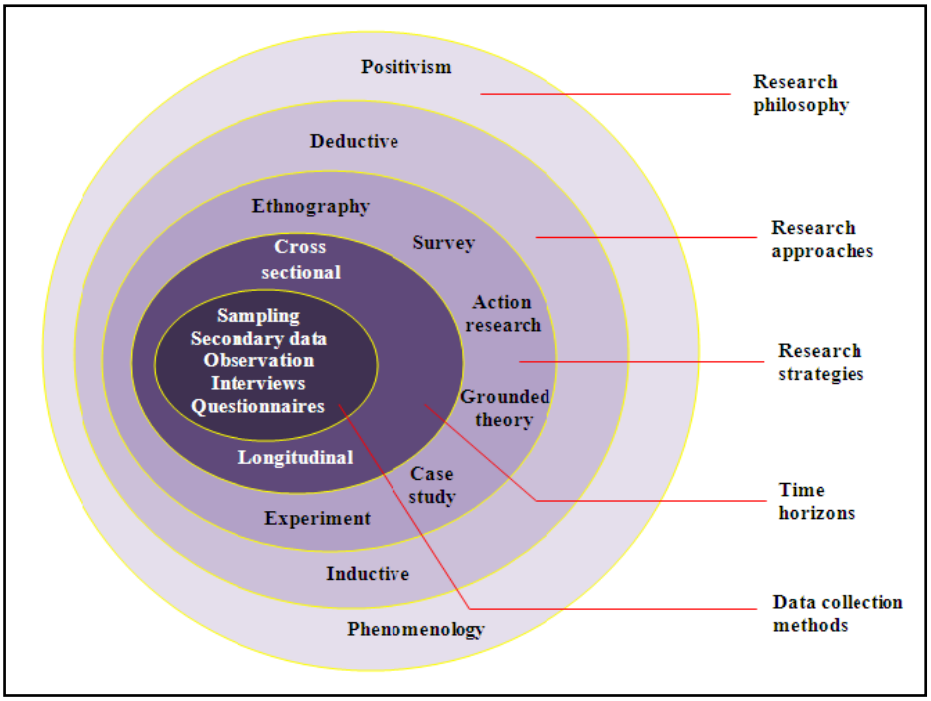


Figure 5.2: The research process 'onion' (Saunders et al, 2003)

The research process as depicted in the research process onion consists of an outer "onion" layer *research philosophy*, followed by the *research approach* layer. The third layer refers to *research strategies*, followed by *time horizons* and at the core is the *data collecting methods* ring. Thus, a discussion on each layer is presented to help make a decision about which is appropriate to use for this research.

5.2.1. Research Philosophy

A research philosophical paradigm is a "lens" through which a researcher views the phenomenon under study (TerreBlanche & Durrheim, 1999). The research philosophies to be considered in this research are *positivism* and *phenomenology*. The philosophies differ in the assumptions of the researcher with respect to the epistemology, ontology and methodology (Trochim, 2000, Burrell & Morgan, 1979).

Positivism

Positivists assume the "lens" that the world is composed of a static external reality that is governed by natural scientific laws (Wardlow, 1989). They apply these laws to investigate the human world to prove, disprove or predict measurable variables (Krauss, 2005). Positivistic research philosophy adopts the stance of investigating trends and patterns of such laws to describe, predict, and control social phenomena. Positivistic research is of a quantitative nature (Punch, 1998, Peshkin & Glesne, 1992). The approach begins with hypotheses and theories. The researcher uses deductive reasoning, based on the numerical measurements to prove or falsify the proposed hypotheses.

Phenomenology

Phenomenologists take on the perspective that the world comprises of people with different experiences, beliefs, attitudes and values. They believe in studying the subjective means of values, beliefs, and social aspects of the phenomena investigation. Researchers, adopting the phenomenology perspective have a deep and sympathetic appreciation of human cultural activities and their experiences (Smith & Heshusius, 1986, Blaxter et. al, 2001). An understanding of such a composite reality requires that human attributes are studied in terms of the context about why they behave in the way that is observed.

The philosophical paradigm seeks to develop theories by describing and interpreting the perceptions and preferences of the people within the context of their interaction, rather than using quantifiable measures. Its objective is to describe meanings, understand definitions by members of the situation, and examine how objective realities are produced. Phenomenologists deal with qualitative data and employ an inductive reasoning strategy to draw conclusions on the research findings (Peshkin & Glesne, 1992). This is an exploratory kind of research that collects and analyses data which are not precisely numeric but are in many forms (Blaxter et al, 2001). Qualitative researchers follow interpretive assumptions to

information inquiry. They believe the best way to understand a phenomenon, is to study it in its context by being immersed in the culture, social life and experiences of the research subjects. It employs an inductive ideology and allows questions to emerge and attain a better understanding as the researcher becomes familiar with the research context. The researchers dispute the existence of unitary reality but rather motivate for the existence of multiple realities. It follows that individuals have different subjective experiences and perceptions that result in different realities.

Table 5.1 summaries the differences between the two philosophical perspectives.

Table 5.1: Research philosophical paradigms (Adapted from Gephart, 1999)

Research philosophy	**Positivism**	**Phenomenology**
Ontological assumptions	Constant external reality , assumes fixed phenomenal relationships	Internal reality of subjective experience
Key focus	Searches variables which cause actions	Searches for patterns and meanings
Objective	Testing and validating hypothesis quantitatively among variables	Describes meanings, understand members and definitions of situations, examines how objective realities are produced
Epistemology	Objective, detached observer, hypothesis testing	Empathetic, observer inter-subjectivity, defining contextual situations
Methodology	Experimental, Quantitative, Hypothesis testing	Qualitative, Exploratory, Inductive

Table 5.1 depicts the major aspects in which the perspectives differ. These aspects are the ontology, key focus, objectives of the paradigm, epistemology and the methodology of the researcher.

5.2.2. Research Approaches

Researchers need to make inferences about the findings to draw meaning from the results based on the perspectives to the research investigation. Researchers derive meaning from the

phenomenon under study by applying deductive or inductive reasoning **(**Kneale & Kneale, 1962; Nickerson et al, 1985; Leedy & Ormrod, 2001).

Deductive reasoning

Deductive reasoning flows in a "top-down" approach. The reasoning of the researcher progresses from a general conceptual framework, (for example, a theory) towards a more specific hypothesis to be confirmed (accepted or rejected) (Schaeken, 2000). It takes a general premise and deduces particular conclusions. (For example, a shape with 3 sides is triangle, an isosceles is a triangle, and, therefore, an isosceles has three sides). Thus, the researcher makes use of known facts to draw a conclusion about a specific situation. This method of reasoning is most common to quantitative research. It uses of experiments and measurements to quantify and generalise the acceptance or rejection of a theory.

Induction

Inductive reasoning is opposite to deductive reasoning. It follows a "bottom up" approach. The researcher begins with specific observations and measures and begins to detect patterns and regularities within a phenomenon and progress to formulate some tentative hypotheses to be explored, and finally develops general conclusions or theories (Porter, 2005). Qualitative researchers generally adopt this kind of reasoning. Figure 5.3 illustrates how the reasoning methods differ.

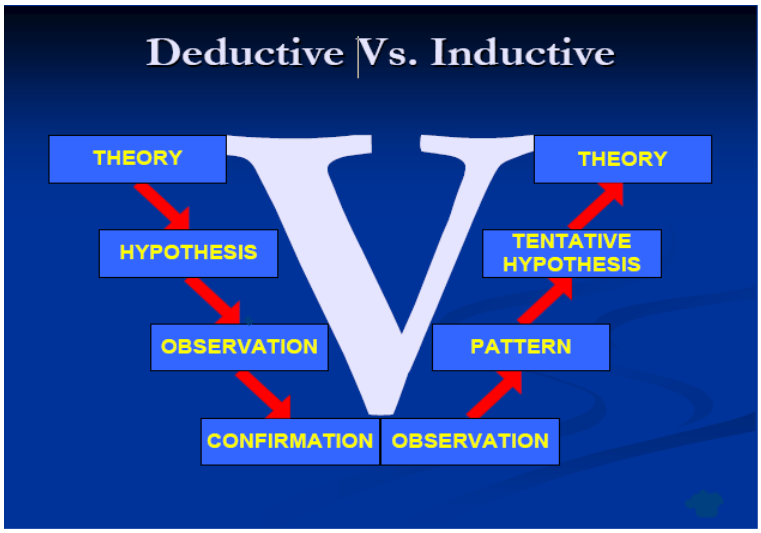


Figure 5.3: Logic of Research (Adapted from Trochim, 2006)

5.2.3. Research Strategies

Saunders et al, (2003) define a research strategy as 'a general plan of how the researcher goes about answering the set research question(s). A good strategy is driven by the research objectives questions. In this section various research strategies are presented and discussed of their appropriateness to be employed in this research.

Case Studies

A case study is an in-depth investigation of an observation or occurrence within a specific context which may reveal hidden evidence within a real life phenomenon (Yin, 2008). It is a strategy that seeks to have an intensive understanding of why the things are the way they exist and what causes such occurrences in the case under investigation (Yin, 2008; Oates, 2006). Thus, the strategy involves choosing a case to be investigated. The selected case has a high resemblance with a particular population, family or institution to which it belongs. The case domain is defined, specifying its study limits and regularities in occurrences are explored (Huysamen, 1994). The research can be done on either single or on multiple cases. Case study research relies on multiple sources of evidence which may include interviews, observations, documentary evidence and questionnaires. Case study findings are useful in hypotheses generating and testing and can be generalised for providing solutions to similar cases (Hofstee, 2006).

Survey

A survey is a deductive-reasoning inclined research strategy (Saunders et al, 2003). It involves asking structured and standardised questions to a sample of individuals as representatives of a chosen community (Hutton, 1990). The representative sample must be knowledgeable about the research area and be willing and able to communicate on behalf of the entire population (Hofstee, 2006). It is the best strategy for inquiring about the opinions, attitudes of the people and their preferences. Its benefits include its efficiency in collecting information from a large number of respondents, flexibility in factual elicitation, and standardisation that makes data analysis easy. Surveys are easy to administer and cost less. They involve administering questions to individuals or groups. The questions can be either structured interviews and/ or structured questionnaires.

Experiments

Experiments are a 'classical form of research' aimed at testing theories and demonstrating relationships between variables for factual prediction and control (Saunders, 2003). This strategy is prevalently adopted in pure sciences research. Experiments seek to demonstrate a cause and effect hypothesis between the variables.

Grounded Theory

The grounded theory strategy was discovered by Glaser and Strauss (1967). It places focus on data analysis while disregarding formal data collection techniques that are not of considerable significance (Sharp et al, 2007). It aims to inductively develop theories from a vast amount of data. It emphasises reading and re-reading written literature from accredited publications on the research area. The grounded theory approach seeks to analyse and categories concepts and properties among variables and their interrelationships (coding) (Strauss & Corbin 1998). Iterative cycles of data collection analysis and coding are performed. These continue up-to a point when no new insights surfaces and the theory is maturely established. The strategy clearly identifies appropriate data collection sources, explores possible constraints and justifies their appropriateness, based on the research questions.

Ethnography

Ethnography is a research strategy that bridges the discipline of social and cultural anthropology where the researcher is required to spend a significant amount of time fully immersed in the lives of the research subject (Myers, 1999). Ethnographic research has become a useful tool in the social sciences. It seeks to place the research domain in its social and cultural context. This strategy is well-appreciated by the phenomenologist. The strength of ethnography, as a research method, lies in the extent to which the researcher gets involved in the lives of the study area. Ethnographers spend significant time in the field "seeing it happening", to develop an in-depth understanding of the beliefs of the people, the common challenges they face, their frustrations, what they like most, and risks that are part of everyday life (Myers, 1999). During data gathering, the researcher observes the situation without any presumption and views everything as a new aspect of interest. Participant direct observations, interviews, questionnaires and study of artefact are the most commonly used data gathering techniques.

Figure 5.4 is a classification of the data gathering techniques used in relation to their applicability to the research philosophies and strategies.

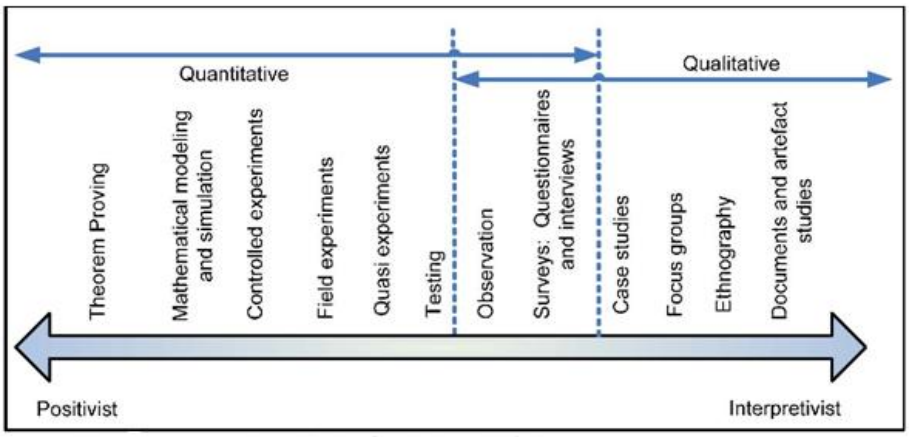


Figure 5.4: Research methods/strategies (De Villiers, 2005)

It is however important to note that the data gathering techniques may overlap on strategies, approaches and research philosophies. Thus, the choice of the applicable data collecting method and research strategy is guided by the research questions.

5.3. Research design and methodology

A theoretical foundation to the planning and designing of this research to implement the suitable methodology has been presented. An understanding of the research disciplines and the research process activities help in choosing the research strategy and methodology that satisfactorily answer the research questions.

The purpose of this section is to outline the research design of this study. The research problem statement is re-stated and the purpose and objectives of this study are defined. The research questions and objectives are the basis of determining the research philosophy, research approach, research strategy and data collecting methods. A description of the research design to determine the evaluation metrics to measure the UX of a selected SMME specific SAA is presented.

A research design can be defined as a systematic process that maps research questions and objectives to empirical data from which conclusions can be drawn (Yin, 2008). It is a systematic process of collecting and analysing information with the objective of increasing the understanding of the phenomenon under investigation (Leedy, 1997).

The research design of this study is based on the following problem statement, research questions and objectives:

5.3.1. Problem statement

This research aims at investigating metrics applicable to evaluate the UI factors that impact on the UX of a typical SAA commonly used in SMMEs in developing countries.

5.3.2. Research questions

The following *main research question* guides the focus of the study research design:

- What metrics can be used to evaluate the UI factors that impact on the UX of a typical SAA used to support the SMME accounting activities in a developing country?

The following *secondary research questions* will help in providing a solution to the stated main research question.

- What are the typical SMME accounting business processes in the business environment of developing countries?
- How can the UX of an SAA be evaluated?
- What are the UI factors that prevent the SAA users from successfully completing their tasks with satisfactory UX*?*

5.3.3. Research objectives

The *primary objective* and purpose of this study is to propose metrics for evaluating the UI factors that impact on the UX of a typical SMME SAA used in a developing country business environment.

The following *secondary objectives* need to be achieved to accomplish the primary research objective;

- To investigate the typical SMME accounting business processes in a developing country.
- To examine the existing UX evaluation methods to establish the applicable criteria for evaluating the UX for a SAA.
- To determine the SAA UI factors that impede the users from successfully completing their tasks and reducing overall positive UX of the software application.

5.4. Research design overview

This study employs a *phenomenologist philosophical paradigm*, based on the problem statement and objectives to understand how the UI factors that impact on the UX of the tool can be improved using the proposed metrics. The research uses an *inductive qualitative approach* and a *case study strategy*. Triangulation of the data collected from the *expert reviews, user observations and subjective user opinions* will validate the findings.

Figure 5.5 illustrates the validation of the data from the data collecting techniques to be used.

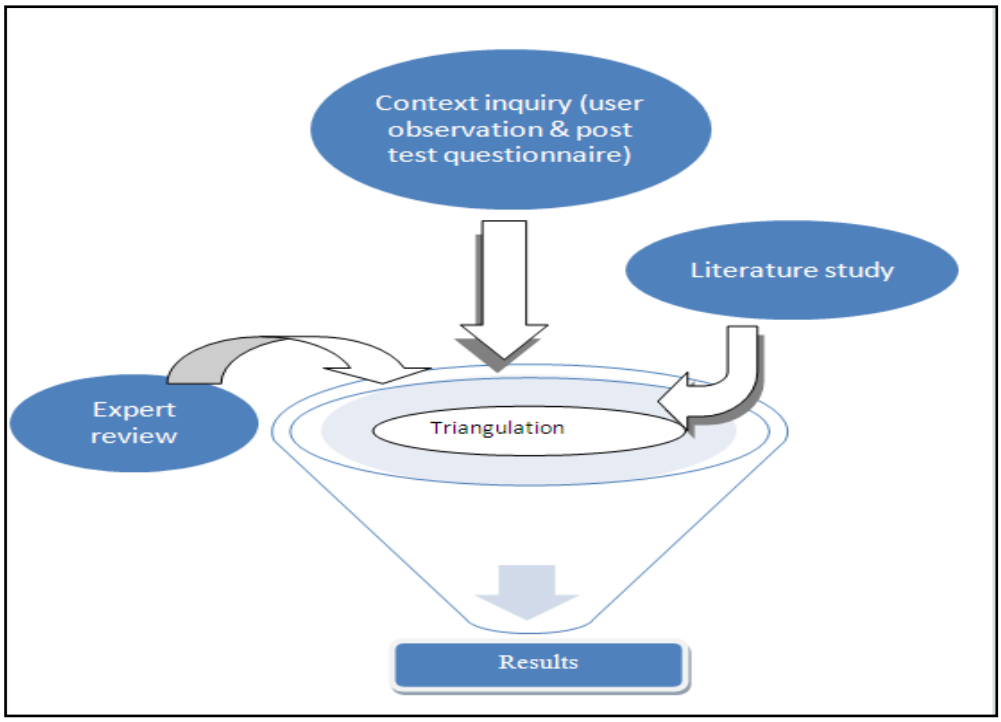


Figure 5.5: Data collecting techniques (Source: researcher's interpretation).

Figure 5.5 illustrates how the final research findings are assimilated to provide credible results. Such a variety of data gathered from various, sources using different techniques provide varied and complementary versions of answers to the research problem (Oates, 2006).

5.5. Case study description

Yin (2008) defines a case study research as '*an empirical inquiry that investigates a contemporary phenomenon within its real life context'*. This strategy is suitable in researching scenarios where the observable facts under investigation cannot be clearly differentiated from the real life situation and for investigating inter-relationships among case entities. In case study strategy, the researcher targets an instance of the case under examination (Oates, 2008; Creswell, 2007).

This case study research strategy aims at improving the understanding of UI factors that inhibit a positive UX of the SAAs used in SMMEs. The researcher seeks to contextually examine the UI-related factors that inhibit the ease-of use, enjoyment and satisfaction gained from interacting with the SAA.

According to Yin (2008) and Stake (1995), a case study follows the following steps to yield credible results:

- The research questions are determined and defined;
- The cases are selected;
- Sampling is done;
- The selection of data gathering and analysis techniques;
- Data collection and findings analysis and evaluation are carried out;
- The results reporting are reported.

These steps guide the design of this case study. The first step (determining and defining the research questions) was addressed earlier. A discussion of the other steps follows:

5.5.1. Selection of case

A single case is investigated in this research. The selection of case involves the choice of research environment, accounting tools to evaluate, sampling and choice of participants to recruit for data collection (research context).

Research Context

Small Medium and Micro Enterprises, (SMMEs) are active engines in sustaining and empowering world economic growth (Sutton & Berth, 2007). In Chapter 2, significant developments and the characteristic of these small organisations were discussed. In response to the increasing numbers of SMMEs, software developers have shifted their attention to the development of SMME specific application tools. However, these SMME specific applications fall short on good UX and usability. This is because of poorly designed user interfaces. The application developers release new versions of the software which still fail to satisfy users, are difficult to learn and use when performing specified tasks within the context of the product use. Due to the stated UX and usability problems, it is significant to evaluate

the UI factors that impact on the UX of the software applications. The proposed evaluation metrics seek to improve the user friendliness, ease of use, satisfaction, positive morale and overall productivity during and after the interaction with the product. Thus, in this study a commonly used SAA used to support SMME accounting activities in developing countries is evaluated as the research case.

5.5.2. Research population

Saunders et al (2003) define a population as 'a full set of cases from which a sample is taken'. The population is not necessarily human but a community of interrelated entities having common characteristics which can be generalized (Bless & Higson-Smith, 2000).

For the purpose of this study, population is considered to be composed of the following:

- A SAA used by SMMEs in developing countries;
- The research participants are users of the accounting tools and experts (comprising of skilled computer users, SAA users and usability experts).

The study sample will be distributed as follows:

- One SAA commonly used in SMMEs is evaluated;
- Nine participants currently using the selected accounting tool are recruited for user observation;
- Three experts are used for the expert reviews.

The SMME-specific SAA is representative of the accounting software used to support accounting business processes in SMMEs in the developing countries business environment. The participants represent the SAA user population. These will provide feedback on the UI factors that impact on a positive UX of the product. They will provide their subjective rating of the application during and after task performance. Usability experts will evaluate the UI factors that impact on the UX of the tool based on the proposed metrics.

The next step with the participant population in place is selection and recruitment of the population sample. The sampling techniques are discussed in Section 5.5.3.

5.5.3. Sampling

Sampling is a procedure of selecting representative units from a population (Yin, 2008). The selected sample is believed to exhibit a resemblance of the population and highlight typical characteristic patterns to which the research findings can be generalised (Trochim, 2006;

Cooper & Schindler, 2008). Sampling techniques are classified into two categories as follows:

- *Probability sampling:* This method involves setting equal chances of random selection of the representative cases within a population. (Trochim, 2006; Oates, 2008).
- *Non-probability sampling;* The selection method does not depend upon the rationale of probability theory; therefore, the probability of a population entity being included in the sample is not certain (Trochim, 2006; Cooper &Schindler, 2008).

The sampling method used in this study is non-probability sampling. It is believed the accounting tool users in the developing countries SMMEs have different UI design perspectives and preferences, thus, no probability can be assigned in choosing the sample. Non-probability sampling methods are further categorised into two types namely: *accidental* or *purposive* sampling (Trochim, 2006). In this research *purposive sampling* is used.

Purposive sampling

This is a sampling method where the researcher takes on the research with a specific purpose and plan in advance. The researcher has preconceptions that the sample is a true representative of the behaviour, attributes and characteristics of the population. Cooper and Schindler (2008) note two purposive sampling types namely: *judgmental sampling* and *quota sampling*.

In judgemental sampling, the population entities are vetted in or out based on a specified criterion that is under investigation (Cooper & Schindler, 2008). In quota sampling, the population is stratified into smaller groups from which the samples are drawn. This assures that the population quotas are well represented in the selected sample (Trochim, 2006).

In recruiting the participants for this study, *judgemental purposive sampling* method is used to select the tool to use and participants.

Accounting tool selection

Based on results from the preliminary questionnaire based survey (*see Appendix B*), Pastel accounting package was the most commonly used SAA by the SMMEs. The results of the survey are presented in Figure 5.6.

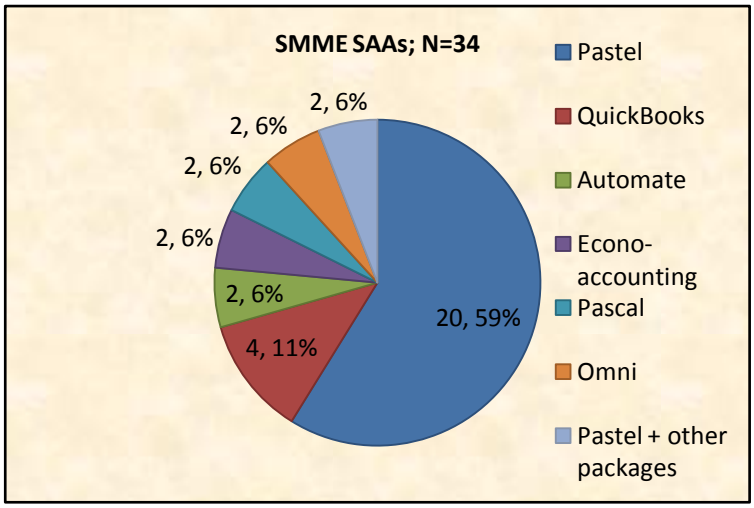


Figure 5.6: SMME SAAs

It is evident from Figure 5.6 that Pastel accounting has the majority of users (59%) when compared to the other tools. It is, therefore, imperative to select Pastel accounting as the case under investigation. The Pastel accounting version to be evaluated is Pastel Xpress 2009. It is designed especially for small businesses and organisations with "basic accounting needs" (Pastel, 2009). A demonstration version of the Pastel Xpress 2009 is used for the evaluation.

In the pilot study, the following activities were found to be common SMME accounting business processes (*see Appendix B for pilot study results)*:

- Inventory management;
- Preparation of financial reports;
- Supplier's documents processing;
- Customer's documents processing;
- Cash book management.

These accounting activities comprise the tasks for the user observation *(See Appendix C for the selected Pastel Xpress 2009 UI screen shots)*.

5.5.4. Data collecting methods

The following data gathering methods are used; *expert reviews*, user observation and post-test questionnaires. The data collection techniques are based on the selected participants. It is important that participants with desirable profiles are always selected because the research

uses judgmental purposive sampling (Rubin & Chisnell, 2008). Efforts were made to get the right candidates for the evaluation activity.

Expert review

This technique of data collecting involves experts who evaluate the UI of the selected SAA in accordance with the proposed metrics. The objective of the expert evaluation is to identify user interface hurdles that hinder the overall user experience (Nielsen, 1994). The expert provides a perspective on how well the UI of the tool promotes a positive UX. The following steps are followed in conducting the evaluation:

Planning:

Planning involves setting up a checklist of metrics ***(****Appendix H****)*** which the expert uses to evaluate the UI of the application. The proposed metrics checklist is based on approved practical heuristics for usability (Perlman, 1997; Nielsen, 1994). It consists of YES, NO and N/A selection options (Barnum, 2002). The checklist consisted of columns for rating the severity of identified UX issues and expert comments for recommended improvements The evaluation checklist used in this study is an adopted version of the Xerox Heuristic Evaluation Checklist (Barnum, 2002).

Choosing the evaluators:

Three experts were chosen to evaluate the Pastel Xpress 2009 UX using the proposed metrics. The experts differed in their domain expertise. The following criteria were used to choose the experts

- Their expertise in Pastel accounting and general accounting background;
- Their expertise in usability and UX evaluation.

One of the selected experts is experienced in both UX evaluation and accounting processes. The second expert has limited knowledge on Pastel accounting and the overall accounting domain and has intermediate UX evaluation skills. The third expert is intermediate in both accounting and UX evaluation knowledge.

Evaluating activity:

A copy of the checklist was sent to the evaluators together with a copy of the Pastel software. The evaluators had to indicate the version of Pastel accounting they had evaluated. The checklist consist of YES, NO and N/A selection options. This three-point checklist method was used to analyze each one of the heuristics (Barnum, 2002):

- **Yes:** If the evaluator agrees the checklist statement to be a problem with the UI of Pastel accounting tool;
- **NO:** If the evaluator disagrees to the statement that there is a problem with the UI of Pastel accounting tool;
- **N/A:** If one believes that the question/statement is not applicable to the evaluation of Pastel accounting UI.

A column for rating the impact of the observed UI problems is provided. The severity of a usability problem is defined as a combination of the following three factors (Neilson, 1995):

- *Frequency* of the problem occurrences: Is it common or rare?
- The *impact* of the problem if it occurs: Is it easy or difficult for the users to overcome?
- The *persistence* of the problem: Is it a one-time problem that users can overcome once they know about it or will the users be repeatedly bothered by the problem?

The experts will rate the severity of the UI problems for the application using a five point Likert scale rating from 0 to 4 as follows (Neilson, 1995):

0 = I don't agree that this is a problem at all;
1 = Cosmetic problem only: need not be fixed unless extra time is available on project;
2 = Minor problem: fixing this should be given low priority;
3 = Major problem: important to fix, so should be given high priority;
4 = Catastrophe: imperative to fix this before product can be released.

A column for comments is provided for suggestions on aspects of the UI of the Pastel accounting application that relate to the evaluation statement which experts may want to suggest to improve on the UX of the tool.

Pilot test:

A pilot test was done prior to the actual test. This seeks to evaluate the appropriateness of the proposed metrics and user tasks. Three experienced computer users with Pastel accounting background participated in the pilot test.

User observation

The purpose of user observation is to investigate the user experiences during and after their interaction with the tool. Aspects of the UI which the participants find to be working well and frustrating are revealed through user observations. What the users do and what they say they do are investigated using the user observation (Oates, 2008). Contemporary interaction occurrences are observed while the users perform their tasks. This helps in understanding the subjective perspectives of the participants (Nachmias & Nachmias, 1992).

During the data gathering, the participants were presented with scenarios and asked to perform specific tasks. See task scenarios script *(Appendix F)* for the tasks presented**.** The selected participants had to complete a biographical questionnaire *(Appendix D)* which provides their general demographical information and accounting background. The purpose of the exercise was explained to the participants and the tasks were presented. The participants were encouraged to 'think aloud' as they perform the given tasks. The users are asked to use the mouse to point to areas of the screen that are used during task performance.

The evaluation activity was steered by a moderator *(See Appendix E for moderator script)*. The moderator was responsible for presenting tasks scenarios, probing the participants, and assisting the participants as needed (Rubin & Chisnell, 2008). The moderator was assisted by an observer who helped in taking task performance notes, gestures and comments of the participants. The experiences of the users were recorded based on their interaction with the system, "think aloud" procedure and mouse movement. The following parameters were significant:

- Number of participants who complete a certain task with or without assistance;
- Significant issues that prevent users from completing their goals or that led to less productivity;
- Pastel Xpress UI aspects that works well for users and those they find to be frustrating;

- Most common errors users make as a result of UI design misrepresentation or ambiguity.

Testing Environment

The tests were done at the workplace of the participants. This was done to maintain their context of application use. The test conditions were made as casual as possible so that the users feel relaxed. Participants were made aware that the objective of the research was not to test their competence in using the tool but rather an evaluation of the usability and UX of Pastel accounting. The participants were told that they can refer to any sort of help that they needed.

The same computer was used for all the nine participants to standardise the test environment. Several Pastel Xpress 2009 companies were created on the computer and each participant worked on a new company to perform the given tasks.

The moderator and observer record the experiences of the participants during task performance. The test plan follows the procedure of conducting usability test suggested by Barnum (2002) with the following steps:

Formulating the objective of usability test:

The purpose of this usability test was to investigate the UI factors that impact on Pastel Xpress 2009 UX.

*Determination of specific evaluation metrics***:**

The UI factors were examined using a set of metrics. The following metrics were previously discussed in Chapter 4:

- Subjective satisfaction;
- Consistence;
- Attractiveness;
- Familiarity;
- Tolerance;
- System terminology;
- Predictability;
- Feedback;

- Help;
- Control and freedom.

User profiles establishment and selection

User profile selection was based on judgemental purposive sampling. The following are the preset criteria for recruiting candidate participants for user observation:

- The candidate is working in an organization classified as an SMME;
- The SMME organizations selected are in South Africa, Port Elizabeth locality;
- The candidate has to be familiar with using Pastel accounting.

The participants who responded to the pilot study were asked to indicate their willingness to participate in a user observation UX evaluation activity. Those interested were vetted, based on the preset requirements, and the qualifying candidates were contacted.

A total of nine participants were recruited for participation in the user observation exercise.

Selecting tasks to be performed:

The appropriate test tasks to be performed were obtained from the results of a pilot study questionnaire. The following came to be the prevalent tasks:

- Inventory control;
- Preparation of financial statements;
- Supplier documents processing;
- Customer documents processing;
- Cash book management.

See *Appendix F for the selected task test scenarios.*

Categorising the results:

The results were categorised into the following types of data (Sharp et al, 2007; Barnum, 2002):

- Number of users completing a task successfully with or without assistance;

- Category of issues encountered by the users for example, navigation, feedback, aesthetic visual design etc;
- Qualitative think aloud remarks and comments.

Questionnaire

After completing the tasks, the participants were asked to complete a post-test questionnaire. They had to rate their subjective experience of using Pastel Xpress 2009 in performing the given tasks. The questionnaire comprises a 5-point Likert scale ranging from *strongly agree* (1) to *strongly disagree* (5). (See *Appendix G* for the post-test questionnaire).

The questionnaire consists of the proposed set of metrics based on the usability heuristics of Nielsen and a modification of the Xerox Heuristic Evaluation checklist (Barnum, 2002).

5.6. Triangulation

Data collected from literature study, expert reviews, questionnaire and observations exists in various formats such as descriptive literature, numeric quantitative data, (for example percentage of users successfully completing a task) and qualitative data from questionnaires and expert-based opinions (expert review). The data collected is inductively and logically analysed to both interpret and structure the meanings that can be derived from it. This inductive approach aims to reveal the pertinent realities with respect to subjective experiences of the users when interacting with Pastel accounting in its context of use. Data gathered from the various sources is triangulated to improve on the credibility of the research results.

The various data collecting methods provide answers to the research question from different perspectives. Triangulation gives the researcher, multiple means of reaching the research objectives (Oates 2006). It increases the credibility of the research findings. Thus, triangulation of the findings provides accurate results in providing a solution to the stated problem. Figure 5.7 illustrates the different data gathering methods and their contribution to the attainment of the research purpose.

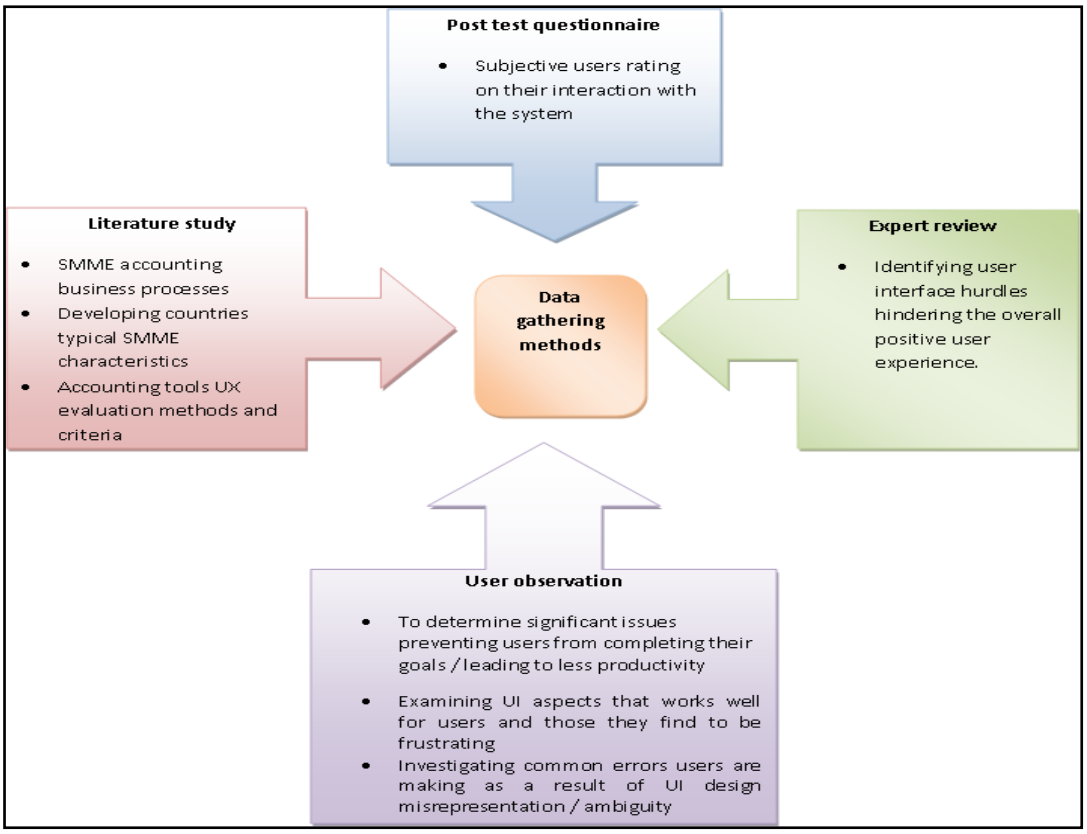


Figure 5.7: Triangulation

5.7. Summary

The research design of this study addresses the research questions and maps them to the research objectives. The literature study and practical experience reveal that Pastel accounting falls short on usability.

This raises the concern of determining the UI factors of Pastel accounting that impact on its UX. Expert reviews, user testing and user satisfaction questionnaires were used to collect the research data to gain an understanding on the UI factors that impact on the UX of the tool. A mixture of data collecting techniques and the triangulation of findings provide credible and reliable results.

CHAPTER 6: RESEARCH RESULTS

6. Introduction

Chapter 5 outlined the study with respect to the research philosophy, approach, strategy and data gathering techniques employed. Descriptive and quantitative data were obtained using the selected research paradigm. The purpose of this chapter is to present and analyse the results from the Pastel Xpress case study. The following results findings are presented and discussed:

- Pilot study results;
- Participants biographical data;
- Participants warm-up comments;
- Task scenario observations;
- After test questionnaire results ;
- Expert review results.

6.1. Pilot study results

An overview of the findings of the pilot study as described in Chapter 2 is presented. The survey comprised of a questionnaire with three sections, namely: organisational details, participant biographical data and the attitude of the participant towards computer use. Its purpose is to gain knowledge about SMME accounting activities, typical SMME accounting tools user profiles and their attitude towards the use of computers. A total of 46 participants responded. (*See Appendix B for the detailed responses*)

6.1.1. Organisational data

The organisational details section requested information about the profile of the organisation and the nature of its accounting system. All 46 participants indicated their organisation have less than 250 employees, thus, they belong to the SMME category. The organisations have some means of maintaining their financial business transactions either using an automated commercial accounting package (61%), spreadsheets (9%), a combination of systems (automated commercial packages, spreadsheet or manual system), (13%) and the traditional pen and paper system (17%). The majority of the organisations (87%) operate as registered entities while 13% did not indicate their legal status. Pastel accounting was revealed be the dominantly used accounting tool (59%) that supports the SMME activities. The following accounting activities are common to the SMMEs based on the responds of the participants:

- Inventory control;
- Preparation of financial statements;
- Supplier documents processing;
- Customer documents processing;
- Cash book management.

6.1.2. Participants biographical profiles

The biographical data results of the participants were presented in Chapter 2. The results reveal that the SMME accounting sector is dominated by females when compared to males. The majority of the participants are in the 41 years and above age group and the 25-29 years age group. The majority of the participants use English as their home language.

The educational profile reveals that most of the participants are holders of at least an undergraduate degree, diploma or certificate from a tertiary institute and use computers almost on a daily basis. The participants have a strong accounting background obtained from university or tertiary college, work and secondary education. Most of the participants are familiar with the Pastel accounting and use it almost on a daily basis.

An understanding of the profiles of the users will help the designers to center their designs to suit the needs of the users or intended users of the application.

6.1.3. Participants attitude towards computer use

Overall, the participants indicate that they are comfortable using computer applications. They indicate that they have a positive attitude to learning about and using computers. They perceive that the use of computers, to a greater extent makes them more productive, efficient and effective in performing their tasks.

6.2. User observation biographical data analysis

A total of nine participants were recruited for the user observation experiment. The candidates completed a biographical data questionnaire to further screen and recruit the intended sample. Individuals who have used or are currently using any version of Pastel accounting were considered as qualified for the evaluation exercise. Only individuals who met the screening criteria participated in the user observation activity. The biographical data consisted of general demographic data and data related to accounting background and any prior use of Pastel accounting. The biographical data category is believed to have no direct

influence on the UX while their accounting background data category is regarded to be an independent variable that impacts on the dependant variable UX.

6.2.1. General demographic data

The following set of demographic data was collected.

- Gender;
- Age;
- Home language;
- General computer experience.

No individual was excluded based on their general background demographics. The purpose of collecting such data is to obtain the typical user profiles of SAAs in SMMEs in the developing countries. Pie charts are used to present the data findings as percentages of the total participants.

Gender

Figure 6.1 depicts the gender distribution of the sample recruited.

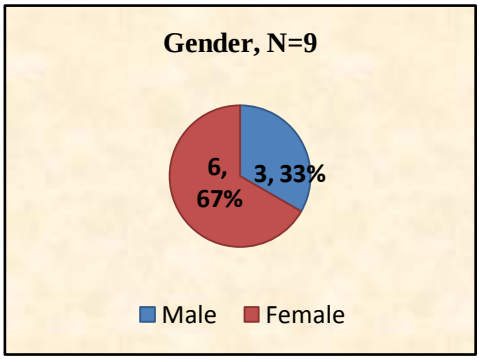


Figure 6.1: Participant gender

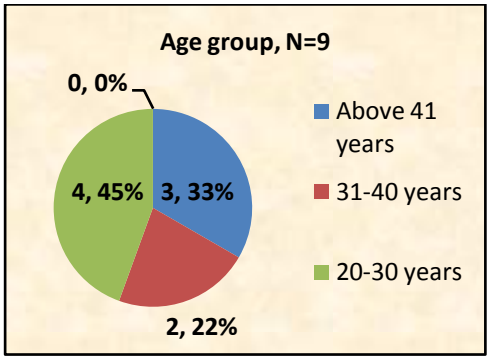


Figure 6.2: Age group distribution

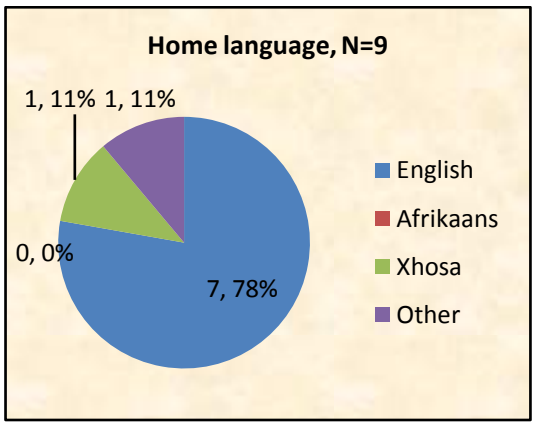


Figure 6.3: Home language

Figure 6.1 illustrates that there are more female (67%) participants than male (33%) participants. This may reflect that there are more females in the developing countries SMMEs accounting sector. Thus, SMME-specific SAAs developers need to balance the UI design directions to cater for this distribution.

Age

The age groups of the participants were presented in Figure 6.2. The recruited sample represented all age groups above 20 years. It has been noted that most of the participants (45%) are in the 20 – 30 years age group, followed by 33% above 41 years age group and finally 31 – 40 years age group (22%). This may suggest that the younger age group join the SMMEs to gain experience in accounting practice while people above 41 years start self-managed small businesses. It is important that the accounting tools developers should consider the preferences for the various age groups to make their products appeal for a positive UX.

Home language

The recruited participants are based in the Port Elizabeth locality. It was expected that the participants would reflect a fair representation of the language groups in the area which are Xhosa and Afrikaans. Figure 6.3 illustrates how the results contrast to the expectation.

The majority of the participants, 78%, are English speaking. However, these findings cannot be generalised to conclude that there are more English people in the SMME accounting sector. Recruitment was based on the voluntary willingness of the participant, thus English speaking people showed the freewill to participate compared to other counterparts. A

balanced representation from Afrikaans and Xhosa people would make the results more diverse and representative of developing country user profiles. It will be important with time to study if the various language groups have different UI design preferences.

Duration of computer use

Figure 6.4 illustrates the duration for which the participants had been using computers for general purposes prior to August 2009.

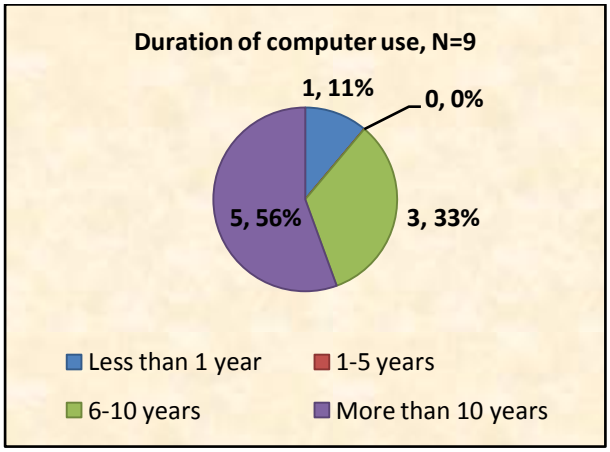


Figure 6.4: Duration of computer use

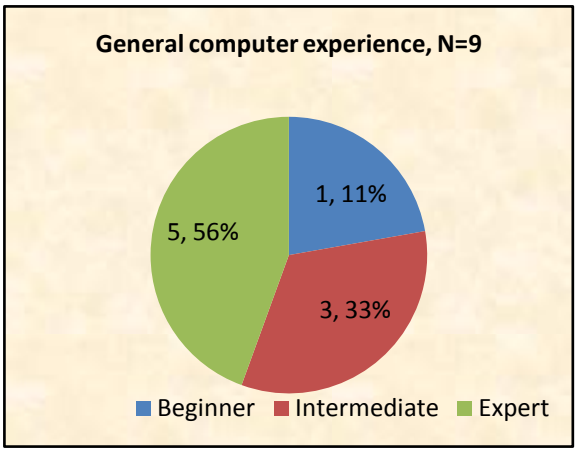


Figure 6.5: General computer experience

The majority of the participants (56%) have used computers for more than 10 years. 33% have used computers for 5 – 10 years while only 11% have used computers for less than a year. All of the participants use computers almost on a daily basis.

General computer experience

Participants were asked to rate themselves with respect to their computer experience. Figure 6.5 depicts their level of computer experience.

Some 56% are expert computer users, 33% rate themselves as intermediate while 11% indicate themselves as beginners with limited computer skills. The duration of computer use and the level of computer experience collaborate in how the users rate their overall interaction with Pastel accounting in comparison to other computer-based applications.

6.2.2. Accounting background

The second category of biographical data collected was based on the accounting background of the participant. Accounting background is derived from their prior accounting training and from the use of any software applications that support a business accounting system. Prior

use of Pastel accounting was the criterion which qualified the candidates for participation in the evaluation exercise. The aim of the exercise is to investigate the UI factors that impact on Pastel accounting UX. Thus, based on the research purpose, it is imperative that participants have prior knowledge of using the Pastel accounting tool. The following demographic accounting background aspects of the participants are considered to be independent variables which influence the dependent variable UX:

- Participant profession;
- Participant prior accounting training;
- Current version of pastel being used;
- Level of experience on using Pastel accounting;
- Duration of using Pastel accounting;
- Frequency of using Pastel accounting;
- Experience in other accounting tools besides Pastel accounting.

The dependent variable UX comprises of the following attributes which have been selected as metrics to evaluate Pastel accounting UX.

- Subjective satisfaction;
- Consistence;
- Attractiveness ;
- Familiarity;
- Tolerance;
- System terminology;
- Predictability;
- Feedback;
- Help;
- Control and freedom.

Participants accounting background biographical data will be presented and discussed in this section.

Participants' profession

It was the aim in this research to have as many SMME accounting professionals as possible. Figure 6.6 depicts the different professionals who participated.

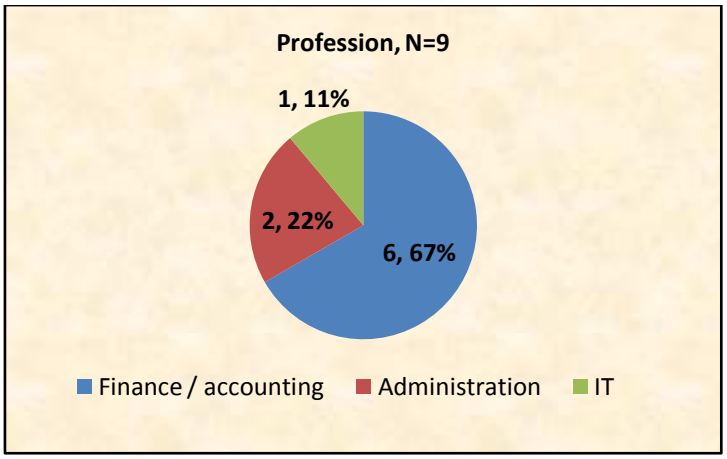
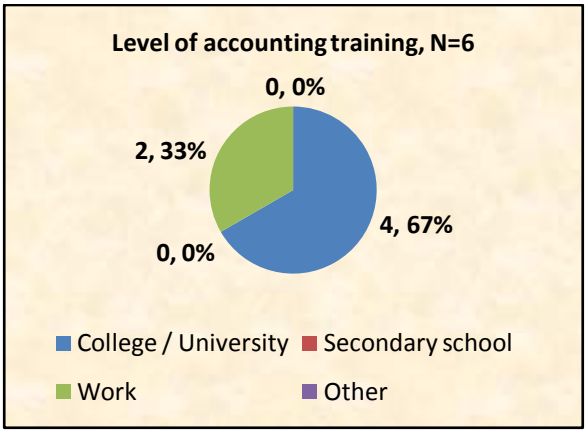


Figure 6.6: Current profession

The majority of the participants 67% are in the Finance / Accounting sector while 22% use Pastel accounting for administrative purposes. One of the participants offers Pastel technical support. Participant current profession is essential when evaluating the experience of the user especially when considering the context of use of the application. How an individual interacts with the tool to accomplish a specific goal determines their overall experience with the product.

Prior accounting training

67% of the participants had formal accounting training at tertiary education and 33% had training at work. Based on their training, the participants are able to evaluate the extent to which Pastel UI design matches their accounting background. Figures 6.7 and 6.8 illustrate the responses of the participants.



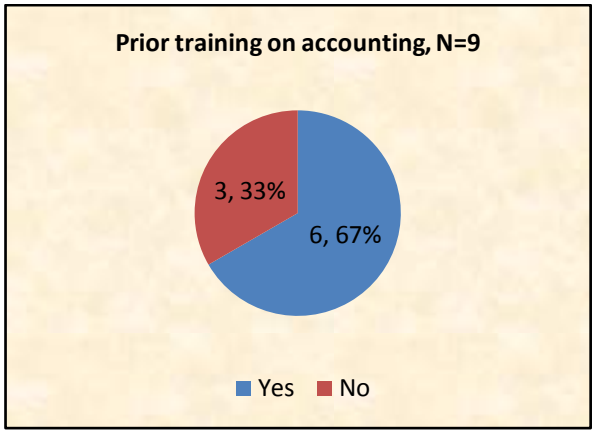


Figure 6.7: Prior accounting training

Figure 6.8: Level of accounting training

Training helps the participant evaluate how familiar the tool is based on theoretical business practice. A good application is familiar with the real business principles and standards for the activities which it supports.

Current Pastel version

Figure 6.9 illustrates the different versions of Pastel currently used by the recruited participants.

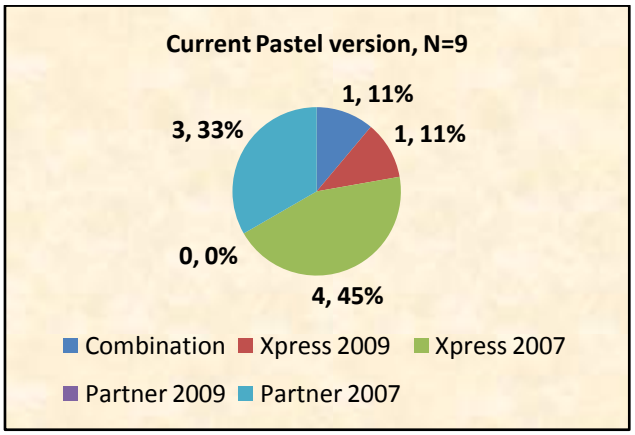
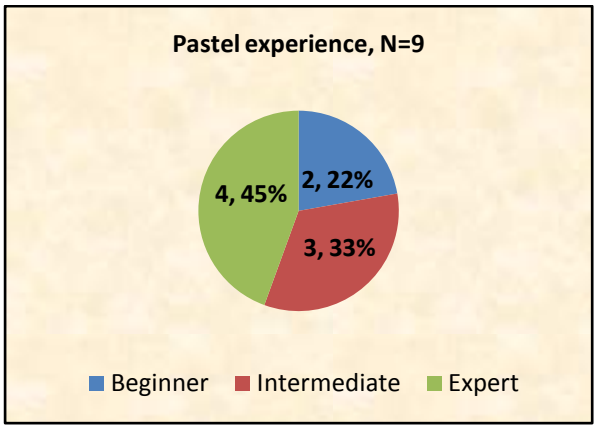


Figure 6.9: Pastel versions

Most of the participants (45%) are using Pastel Xpress 2007, 33% use Partner 2007 version while 11% use Xpress 2009. Another 11% use a combination of Pastel versions (Xpress, Partner and Evolution). Such a diverse user profile helps to compare how the participants feel about their interaction with Pastel Xpress 2009 version. They can rate their experience in relation to counterpart Pastel versions. Such results are important in evaluating the Pastel accounting UI design consistence.

Level of Pastel accounting experience

The recruited participants had mixed levels on Pastel accounting usage as presented in Figure 6.10.



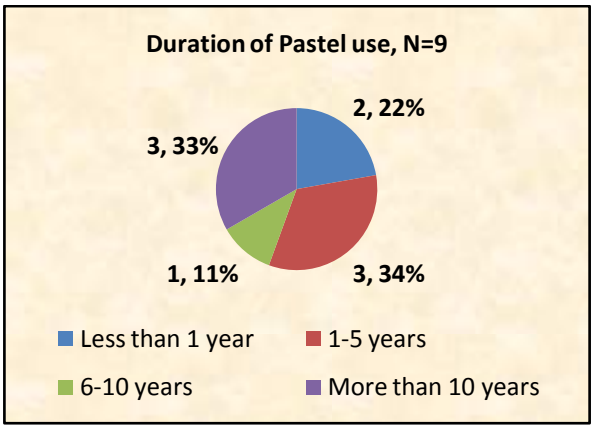


Figure 6.10: Level of Pastel experience

Figure 6.11: Duration of Pastel use

Some 45% of the participants are expert users, 33% are intermediate while 22% rate themselves to be beginners. Such a mixed user profile results in varying feedback while rating the overall experience during and after interacting with the tool.

Duration of using Pastel

Figure 6.11 illustrates the use Pastel accounting by the participants prior to August 2009. All the participants indicate that they use Pastel on a daily basis.

All the participants recruited are knowledgeable using Pastel accounting. 34% of the participants have been using Pastel for a period between 1 and 5 years, 33% used the tool for more than 10 years while 22% used it for less than a year and 11% have been using the application for a period between 6 and 10 years. A mixed duration of Pastel usage should yield informed user experience feedback.

Other accounting tools used beside Pastel

Figure 6.12 illustrates the percentage of participants who have used other accounting tools besides Pastel accounting.

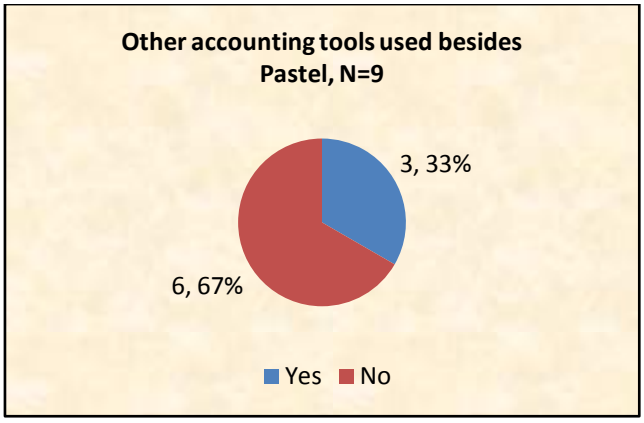


Figure 6.12: Other accounting tools used besides Pastel

Some 67% of the participants indicated that they have no experience in any other accounting package while 33% indicate they have used other accounting packages. This justifies choosing Pastel accounting as the most dominant accounting tool used in SMMEs and, thus, worth to be researched on its UX. Comments from those who have used other packages will motivate further study to include evaluation of other SMME specific accounting applications for a comparative study.

6.3. Warm up comments

After completion of the biographical data questionnaire, Pastel Xpress main window was launched and the participants were asked to comment on the tools main window with respect to the following aspects:

- Attractiveness;
- Navigation options;
- Icons used;
- General comments.

During the warm up exercise, the participants were encouraged to "think aloud" as to what they felt about the main window design. Participants were asked to move the mouse to the UI aspects which they were commenting on.

6.3.1. Attractiveness

Participants were asked to comment on how attractive they find the UI of Pastel Xpress 2009 main window to be. The participants had to comment on the appropriateness and aesthetic of the main window design. Attractiveness includes aspects like the choice of colours used and

the visual design of the Pastel accounting main window elements. Table 6.1 describes the feedback by the participants with respect to the attractiveness of the application.

Table 6.1: Pastel Xpress 2009 main window comments

Warm Up Comments on Pastel Main Window

Category	Participants comments								
	Part-1	Part- 2	Part- 3	Part-4	Part-5	Part-6	Part-7	Part-8	Part-9
Attractiveness	Not concerned about colours used.	Interface is colourful and looks nice.	Acceptable interface, not harsh on eyes.	Quite simple, clear and clean attractive interface.	Good use of colours, attractive and welcoming interface.	Colours do not matter, what matters is the functionality.	Not concerned about colours used.	Likes the colours used.	Good use of colour, colour helps to recognise task windows.

Overall, the participants were pleased with Pastel Xpress UI attractiveness. They commented that the main window was attractive, aesthetically pleasing, smart and nice to work with. The majority of the participants (six out of nine) enjoyed working with the colourful interface and commented that the colours helped them to recognise the task windows. It has, however, been noted that female users are particular about colours while males are less interested in the aesthetic design of the application. What matters most to men is the functionality of the tools.

6.3.2. Navigation options

Pastel has a variety of means to access task components. The commonly used options include drop-down menu, icons bar, system navigator and the explorer. The participants were asked to comment on the navigation options available and their preferences noted as they interacted with the application. Table 6.2 summarises the comments of the participants and their navigation related observations as they interacted with the system.

Table 6.2: Pastel Xpress 2009 navigation comments

Warm Up Comments on Pastel Main Window

Category	Participants comments								
	Part-1	Part -2	Part-3	Part- 4	Part-5	Part-6	Part- 7	Part- 8	Part- 9
Navigation options	"Navigat or very user friendly", likes using icons options.	Prefers to use icons on the icon bar.	Makes use of icons for navigation.	Prefers using menu bar navigation option.	Prefers icons for navigation.	Prefers icons for navigation.	Diversity in navigation uses keyboard shortcuts, menu list and explorer.	Uses system navigator, it tells who, what and what's within.	Makes use of icons.

The majority, as depicted in Table 6.2, preferred interacting with the application through icons. Thus, the appropriate use of icons in the design of the UI of the application is expected to positively promote UX.

6.3.3. Icons used

The participants were asked to comment on the appropriateness of icons used. They had to comment on how the icons matched the real world and their mental model and how the icons are representative metaphors for the tasks they represent. The participants were asked to identify the tasks represented by each icon and comment on how the icons relate to the task. Table 6.3 presents the comments from the 9 participants.

Table 6.3: Pastel Xpress 2009 icons comments

Warm Up Comments on Pastel Main Window

Category	Participants comments								
	Part-1	Part-2	Part-3	Part- 4	Part- 5	Part- 6	Part- 7	Part- 8	Part- 9
Icons used	Could not recognise icons without mouse move over text.	Failed to recognize all icons relating tasks. Emphasised "it's a different version to the one I use".	"Not familiar with the graphs, icons are too small and somehow different from my Xpress 2007 version".	"If you know the application its quite easy, icons are confusing for first time users".	Likes labelling of icons on move over.	"Xpress icons are a bit small".	"All icons are ok". "Previous versions icons are much better , bigger and brighter", prefers such design	"Icons are clean and neat making it easy to use then in task".	Xpress 2009 icons are different form prior version, the previous version icons looks much better than, can relate tasks to icons on move over tips

Those participants who are not familiar with Xpress 2009 version failed to recognise the icons without the mouse-over text tips. The participants liked the presence of these tips telling them what the icon is for. Overall, the participants found Pastel Xpress 2009 icons to be different from the previous versions. They commented that the icons of the previous versions look much nicer, brighter and relate to tasks well compared to those of Pastel Xpress 2009 version. Thus, the UI fell short on consistence.

6.3.4. General comments

Table 6.4: Participants general comments

Warm Up Comments on Pastel Main Window

Category	Participants comments								
	Part 1	Part 2	Part-3	Part- 4	Part-5	Part- 6	Part-7	Part- 8	Part- 9
General comments	"Wouldn't know where to go without prior training, quite confusing for first time users"	"Icons do not look familiar to the ones am used to". Refers to owns version of Pastel.	With prior experience it becomes easy to recognise the icons used. It however won't be easy for first time users	Complex system with lots of functionalities, there is need of adequate training to be a competent user.	Suggests use of the terms "creditors" and "debtor" instead of customers and suppliers.	The interface is nice but one needs training to know what to do with the application.	"Very efficient application usable , you need to know what you want to do to be a good user, the system does not tell you what to do	Pastel lacks training, one cannot be competent if you don't have the training.	The user interface can be confusing if one is new to the application.

Overall, the participants indicated that without intensive training on Pastel accounting, the tool is difficult to interact with. First-time users will not be able to use the application with ease, thus, the Pastel UI is not intuitive. The first interaction with any product always determines long lasting experience with the product. It is important that the Pastel Xpress UI be designed with first-time users in mind, so that they find it usable, easy to use and appealing for a positive user experience.

6.4. Task scenario observations

After commenting on the main window of the application, the participants were presented with a set of tasks to perform. Their purpose was to evaluate the UX of the tool while they interact with it. The evaluation activity aimed at investigating the following aspects:

- Significant issues that prevent the users from completing their goals or which leads to less productivity;
- Pastel Xpress UI aspects that work well for users and those they find to be frustrating;
- Most common errors users make as a result of UI design misrepresentation or ambiguity.

A set of the proposed UX measurement attributes were used as the criteria to evaluate the UI factors of the tool that impact on UX. During task performance, the participants were

observed and their navigational preferences, frustrations and pleasures from interacting with Pastel Xpress 2009 were noted. The task parameter of interest in this study was to track the number of participants who manage to complete a given task successfully. It was recorded whether the participant managed to complete a task with assistance either from the moderator or any source beside the helpline of the tool. A task is complete only if the participant successfully manages to enter all the given information and process the given transaction correctly. Failure resulted when the participant gave up or confirmed that the task was completed but the user had done a wrong transaction or omitted some relevant data. No time bound task performance related measures were recorded.

During task performance, raw data from the moderator and observer notes were handwritten on scripts which corresponded to the respective participant. The handwritten scripts were recorded onto spreadsheet and similar data summarised. Data were compiled to view existing patterns whilst noting the number of participants who successfully completed the tasks and while noting any common difficulties encountered by the participants in each task. The prevalent errors and difficulties that impeded the users from completing the task were identified and the source of errors analysed. The identified sources of errors were rated for their severity and impact on UX in a UX issue list.

6.4.1. Task performance

Participants were presented with the following tasks:

- Task 1: Adding a new user to the system;
- Task 2: Adding a new inventory item to the inventory database;
- Task 3: Processing supplier documents (purchase order and tax invoice);
- Task 4: Adding a new account customer;
- Task 5: Cash book processing (recording receipts and payments).

Table 6.5 summarises task performance.

Table 6.5: Task performance summary

Task performance summary

Participant	Task 1	Task 2	Task3	Task 4	Task 5
Part -1	Struggled and quitted 'never done it before'	Completed PO, Thrilled by the linking option, completed supplier invoice	Struggled to get it but finally managed. Failed to set preferred supplier and prices	Completed easily	Failed. confused on receipts and payments tab, mixed the transitions
Part -2	Did not attempt, had no idea	Completed easily	Completed after referring to her computer	Failed even after referring to own computer for setting credit limit, pricelist and terms	Completed kept on referring to own computer
Part-3	Failed to complete	Completed easily	Completed easily	Completed easily	Completed easily
Part-4	Struggled at the beginning but eventually added the users, gave up on setting access levels	Frustrated when system took long , thought computer was froze, no feedback , completed the task	Overly completed quickly , commented nice feature maximum and minimum order levels	Excited and confidently completed ,	Completed easily
Part-5	Did not attempt, I always call my boss	Completed with assistance, liked linking option the pop up message	Gave up even after assistance	Completed easily	Completed easily
Part -6	Gave up on setting access rights	Completed easily	Completed easily	Completed easily	Completed easily
Part-7	Completed easily	Quite easily done	Quite easily done	Quite easily done	Quite easily done
Part- 8	Completed with assistance on setting user rights	Completed quickly	Completed quickly	Completed quickly	Completed quickly
Part-9	Failed to set access levels	Completed easily	Completed easily	Completed easily	Completed easily

UX related observations were noted and recorded during task performance. Figure 6.13 presents a discriptive statistical analysis about task performance. It shows the percentages of participants who completed a specific task, particpants who completed the task with assistance and those who failed to complete the given task.

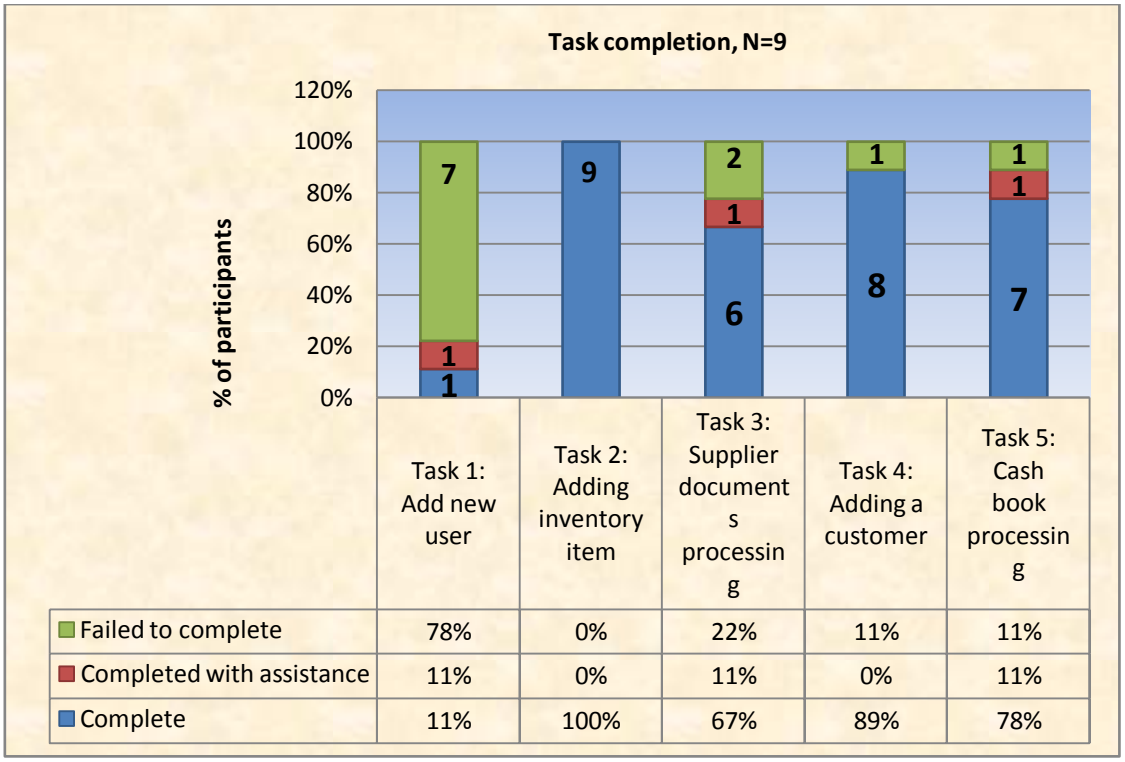


Figure 6.13: Task completion

Figure 6.13 illustrates that Task 1 was poorly performed with 78% of the participants failing to complete, 11% completing with assistance and another 11% successfully completing it on their own. Most participants gave up after failing to find the options to navigate to the required window to add a new user to the system or for setting user system access levels. The participants commented that the task was not familiar, the option to navigate to the window was not clear and they have had no training on such a task and, therefore, failed to complete it. None of the users referred to the Help function. Some indicated that they call for support if a user is to be added in real business. Overall Task 2 and Task 4 were successfully completed with ease. The participants commented that the two tasks had some UI design similarity. Such a design resemblance made it easy to successfully complete the two tasks once the user has managed to complete either task. Task 3 and Task 5 were averagely performed.

Observing the task performance gave a clear indication about which tasks were difficult for the participants. During the participant interaction with the system, it was noted which of the UI aspects of the tool impeded successful task completion, those aspects of Pastel Xpress UI that the participants found to work as they expected and the difficulties they faced due to failing to understand the UI elements. User observation findings form the basis for UX issue list.

6.5. Questionnaire results analysis

The participants had to complete a post-test questionnaire immediately after completing the given tasks. The questionnaire had both negative and positive statements to avoid questionnaire leading to question biases. The questionnaire was in Likert scale design with 5 score rating ranging from *strongly agree (1) to strongly disagree (5).* The responses of the participants are discussed in this section. Questionnaire results are analysed using the top-2-boxes and bottom-2-boxes response technique (Tullis & Albert, 2008). Top boxes are response options with the highest number participant response count. Bottom boxes are those with the lowest participant count. In cases where there is equal number of participants for response option, the equal response entries are all considered for analysis.

6.5.1. Subjective satisfaction

Table 6.6: Subjective satisfaction participants' response

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 1.1: Overall, I am satisfied with the ease of completing the tasks	4	2	2	1	0
Item 1.2: Pastel accounting system is complicated making it not pleasing to use	0	1	2	0	6

Table 6.6 presents the response by the participants on how they rate the subjective satisfaction on Pastel Xpress 2009 user interface. The results of this UX metric indicate that most of the participants (six out of nine) overall had a satisfactory experience in completing the given tasks. They completed the given tasks with ease. From the top-boxes responses four of the participants strongly agreed, two agreed while two were neutral that they were satisfied with the ease of using the tool to complete the given tasks. In response to Item 2 of subjective satisfaction attribute, six of the participants strongly disagreed to the statement that the tool is complicated and not pleasing to use.

It may be concluded that overall the tool is satisfactorily pleasing to interact with and is easy to use in performing specific tasks based on the results from the ratings of the two statements.

6.5.2. Consistence

Participants were asked to rate how the Pastel Xpress 2009 UI design is consistent. Similar commands, labels, words and actions performing similar should be presented consistently throughout the application. Standard conventional UI design aspects like shortcuts must

follow general accepted platform conventions. Table 6.7 presents the subjective responses of how the participants find the UI of the tool to be consistent.

Table 6.7: Pastel Xpress 2009 UI consistence participants' response

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 2.1: Pastel accounting design is confusing making it difficult to do my work	0	0	2	1	6
Item 2.2: I find same function keys to be consistent throughout the system performing similar function	3	1	2	1	2

Six of the nine participants strongly disagreed that the UI of the tool is confusing while one disagreed and two were neutral. None of the participants indicated the UI of the application is confusing. In response to the consistence of the function keys and commands used, three participants strongly agreed (top-box) that the UI elements design is consistent. An equal number of participants were neutral and strongly disagreed on the consistence aspect (two each). The bottom-2-boxes comprise of an equal response value of participants agreeing to the statement and disagreeing (one each) to same statement on the consistence of similar keys.

The overall result suggests that there is consistency in Pastel Xpress 2009 UI elements. Once an individual manages to know some component of the UI he / she is unlikely to be confused with the rest of the similar functionality, thus, promoting a positive UX.

6.5.3. Attractiveness

Attractiveness deals with the aesthetic and application presentation design. The results presented in Table 6.9 indicate the ratings of the participants on the UI aesthetics and choice of colours of Pastel Xpress 2009.

Table 6.8: Pastel Xpress UI attractiveness participants response

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 3.1: Pastel accounting user interface is simple and clean	4	3	1	1	0
Item 3:2: Overly, am pleased with the choice of colours used throughout the application	3	3	1	1	1

As presented in Table 6.8, four of the nine participants strongly agreed Pastel Xpress UI to be simple and clean while three agreed with the statement. None of the participants strongly disagreed while only one participant was neutral and another disagreed that Pastel Xpress UI is simple and clean. The responses of the top-2-boxes (strongly agree and agree) convincingly outnumber the bottom-boxes (strongly disagree) and this makes it practically acceptable that the UI of the tool is simple and clean.

The top-2-boxes results on Item 2 of the attractiveness aspect consist of three participants who strongly agree and three participants who agree that they are pleased with the choice of colours used throughout the system. The bottom-box consist of one participant who disagrees and another strongly disagreed to the statement. Thus, it can be agreed Pastel Xpress choice of colours is attractive and enhances a pleasing experience to the users.

6.5.4. *Familiarity*

Table 6.9: Participant's response to Pastel Xpress 2009 UI familiarity

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 4.1: This system felt familiar due to my prior knowledge of other computer based systems.	3	1	0	1	3
Item 4.2: My background on accounting helped me use Pastel accounting easily.	5	1	1	2	0

The results of this section indicate mixed user experiences on the familiarity of the UI of the tool. The top box responses are of opposite ends, three participants strongly agree and another three strongly disagree that their prior background on other computer system made Pastel Xpress UI familiar. On the contrary, one participant disagreed while another agreed to have found Pastel Xpress familiar due to prior knowledge of other computer based systems. None of the participants were neutral. One participant did not provide an answer to the question.

However, five of the participants strongly agreed that the tool felt familiar due to their prior background on accounting. Two participants disagreed that the tool is familiar due to prior accounting experience. Based on the findings, it is noted the participants have mixed experience on how familiar they find the tool to be due to their general computer experience and accounting background.

6.5.5. Tolerance

Table 6.10 presents the responses that the participants find Pastel Xpress to be tolerant and preventive on errors.

Table 6.10: Participants rating on Pastel Xpress 2009 UI tolerance

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 5.1: On errors Pastel accounting error messages indicate the action I need to take to correct the error	0	1	3	2	3
Item 5.2: The system always gave me messages warning me of possible errors possible	0	0	3	2	4

The participants found Pastel accounting errors to not be informative on the action needed to be taken to rectify the error. Only one agreed that the Pastel accounting error messages indicate the action needed to correct the error. The top-2-boxes comprise of three neutral and three participants who strongly disagree that Pastel accounting error messages indicate the action needed to be taken to correct the error.

In reply to Item 2 about the tolerance aspect of the application, four participants strongly disagreed (top box responds) that the tool always warns them of possible errors while three of the participants were neutral on this aspect. None of the participants agreed that the system is lenient to errors.

Overall, Pastel accounting lacks lenience in warning users on possible errors and does not inform users on action to be taken to rectify any errors.

6.5.6. System terminology

The results presented in this section indicate how the participants rate the appropriateness of the terminology in Pastel Xpress 2009 UI. Table 6.11 shows such results.

Table 6.11: Participants rating on system terminology

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 6.1: The terms used in Pastel accounting commands and objects are common in the accounting field.	3	3	3	0	0
Item 6.2: I fail to understand some of the terms used in Pastel accounting menus and objects.	0	1	2	2	4

The top-boxes responses indicate that Pastel accounting terminology generally adheres to the terms used in the accounting field. Three of the participants strongly agreed while three agreed and three were neutral that they found this to be true. None of the participants disagreed or strongly disagreed to the statement.

In response to the understandability of terms used in the Pastel accounting menus and objects, four of the participants strongly disagreed that sometimes they failed to understand Pastel accounting terminology. Another two disagreed with the statement while two were neutral. None of the participants strongly agreed to the difficultness of understanding Pastel terms while one participant agreed that at times the terms used are confusing.

As depicted in Table 6.11, Pastel design avoids use of computer-oriented jargon but uses accounting-context, specific terminology which is well understood and appreciated by the users.

6.5.7. Predictability

Table 6.12: Participants response on predictability

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 7.1: While performing the tasks I would get results that I predicted and expected.	2	4	0	3	0
Item 7.2: Sometimes when using a Pastel accounting things seem to happen and I don't know why	3	4	0	0	2

The top box responses consist of four participants agreeing and two participants strongly agreeing that they always get results they expected from their actions. In the bottom box responses, none of the participants was neutral or strongly disagreed with the statement.

Four of the participants agreed that occasionally the tool gave them responses which they cannot account for and three participants strongly agreed that at times, when interacting with Pastel accounting the tool appeared to behave in an unexpected manner. Thus, overall, the participants indicated to have mixed interaction experiences with the predictability of tool.

6.5.8. Feedback

Table 6.13: Participants' response on Pastel Xpress 2009 feedback

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 8.1: At times the system leaves me wondering whether I have successfully completed the task or not.	7	1	1	0	0
Item 8.2: Whenever there is an observable delay in the systems response, the system keeps me informed of the processing.	0	0	2	1	6

As shown in Table 6.13, Pastel accounting tool falls short on providing the users with feedback while they interact with the application. The tool does not inform the users whether a transaction has successfully been completed or not. In cases where the system is busy processing a transaction, the tool leaves the users wondering what is taking place and at times the users end up thinking the computer is frozen.

6.5.9. Help

Table 6.14: Participants rating on Pastel Xpress help function

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 9.1: When stuck I could easily refer to the Pastel accounting help and find my way out.	0	0	0	1	8

The majority of the participants (eight out of nine) strongly indicated that they found Pastel Xpress Help to be useless. As presented in Table 6.14 in the bottom response boxes, none of the participants agreed to find Pastel Help to be of use.

6.5.10. Control and freedom

Table 6.15: Participant's rating on control and freedom

N=9	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Item 10.1: Moving between different screens and pages in Pastel accounting was easy for me.	4	2	2	1	0
Item 10.2: At times I failed to make the system do exactly what I wanted it to do.	3	1	1	0	4
Item 10.3: At times I did not know where to go next to complete a given task.	4	3	1	0	1

Overall, the participants found it easy to navigate from one screen to another during task performance. Most of the participants, four out of nine strongly agreed that moving between different screens was easy while two agreed to the statement and two were neutral. None of the participants found it extremely difficult to navigate the application and one participant indicated it was somehow not easy to move between different screens.

In response to Item 2 on control and freedom, the top-box responses consist of extreme ends. Three participants strongly agreed that they failed to make the system do exactly what they wanted while one participant agreed that at times it is difficult to control the system. At the other end, four participants strongly disagreed and indicated they are always in control and can manipulate the system to do exactly what they want it to do. One participant was neutral while none disagreed with the statement.

Four out of the nine participants strongly agreed there are times they would get stuck and not know the next step to take to complete a given task. Three agreed, one was neutral while another strongly disagreed indicating that they always know what they had to do to complete specific task.

Responses to the extent to which the participants are in control of the application indicate that the participants encounter diverse experiences. Overall, participants find it easy to navigate from one screen to another; the system does not always tell the users what to do next to complete a given task and to some users, it is not easy to make the system do exactly what they want it to do.

6.6. Heuristic evaluations results and analysis

Three expects evaluated the Pastel UI based on the provided metrics (*see Appendix F*). The participants differed in their level of Pastel accounting expertise and usability evaluation. The purpose of the expert review is to inspect the UI factors that impact on Pastel accounting UX. Based on the feedback from the experts, the study aims to establish the appropriateness of the metrics in evaluating the UI factors that impact on Pastel UX and, thereby, make comments that suggest how Pastel UI design can be improved for the future UX and UI interaction satisfaction.

The following options were provided to answer the given metrics subsections:

Yes: if the expert agrees with the statement/question in relation to the Pastel Xpress accounting user interface;

No: If the expert disagrees with the statement/question in relation to the Pastel Xpress accounting user interface;

N/A: If the expert believes that the statement/question is not applicable to the Pastel Xpress accounting user interface.

The following five point scale rating from 0 to 4 were used to evaluate the severity of Pastel accounting tool divergence from the metrics

0: I do not agree there is a usability problem at all;

1: Cosmetic problem only- need not to be fixed unless extra time is available;

2: Minor usability problem- fixing this should be given low priority;

3: Major usability problem – important to fix should be given high priority;

4: Usability catastrophe- imperative to fix this immediately.

Comments: The comments section is available to enter any comments relating to the specific statement or question and how it relates to the Pastel accounting user interface. It may be used to make suggestions for improvement.

Table 6.16 depicts the results of the expert reviewers

Table 6.16: Expert review results

Expert review results					
Istem number	Expert 1	Expert 2	Expert 3	Overall result	UX issue rating
1. Attractiveness					
1.1	Yes	Yes	Yes	Yes	0
1.2	Yes	Yes	Yes	Yes	0
1.3	Yes	Yes	No	Yes	1
1.4	Yes	Yes	Yes	Yes	0
1.5	Yes	Yes	No	Yes	0
1.6	Yes	Yes	Yes	Yes	0
1.7	Yes	Yes	Yes	Yes	0
1.8	Yes	Yes	Yes	Yes	0
1.9	Yes	Yes	Yes	Yes	0
2. Help					
2.1	Yes	Yes	No	Yes	1
2.2	Yes	Yes	Yes	Yes	0
2.3	Yes	Yes	Yes	Yes	0
2.4	Yes	Yes	Yes	Yes	0
2.5	Yes	No	Yes	No	3
2.6	Yes	No	Yes	Yes	1
2.7	No	No	No	No	4
2.8	Yes	Yes	N/A	Yes	0
2.9	Yes	Yes	Yes	Yes	0
3. Error Tolerance					
3.1	No	N/A	N/A	No	4
2.2	No	N/A	No	No	3
3.3	Yes	No	No	No	1
3.4	Yes	Yes	N/A	Yes	0
3.5	Yes	No	Yes	Yes	0
3.6	Yes	No	Yes	Yes	0
3.7	Yes	N/A	N/A	Yes	0
4. Familiarity					
4.1	Yes	Yes	Yes	Yes	0
4.2	Yes	No	Yes	Yes	0
4.3	Yes	Yes	N/A	Yes	0
4.4	Yes	No	Yes	Yes	0
4.5	Yes	Yes	Yes	Yes	0
5. Consistence					
5.1	Yes	Yes	Yes	Yes	0
5.2	Yes	No	Yes	Yes	1
5.3	Yes	Yes	Yes	Yes	0
5.4	Yes	Yes	N/A	Yes	0
5.5	Yes	Yes	Yes	Yes	0
5.6	Yes	Yes	No	Yes	1
5.7	Yes	Yes	Yes	Yes	0

5.8	Yes	Yes	Yes	Yes	0
5.9	Yes	No	No	No	2
6. Feedback (Visibility of system status)					
6.1	No	No	No	No	4
6.2	No	No	No	No	4
6.3	Yes	Yes	Yes	Yes	0
6.4	No	No	No	No	4
7. User Control and freedom					
7.1	Yes	No	No	No	2
7.2	Yes	Yes	Yes	Yes	0
7.3	Yes	Yes	Yes	Yes	0
7.4	Yes	No	No	No	2
7.5	No	No	No	No	3
7.6	Yes	Yes	Yes	Yes	0
8. System Terminology					
8.1	Yes	Yes	Yes	Yes	0
8.2	Yes	Yes	Yes	Yes	0
8.3	Yes	Yes	Yes	Yes	0
8.4	Yes	Yes	Yes	Yes	0
8.5	Yes	Yes	Yes	Yes	0
9. Predictability					
9.1	Yes	Yes	Yes	Yes	0
9.2	Yes	Yes	Yes	Yes	0

The overall UX rating was placed basing on how the researcher considered the severity of the usability issues observed by the experts. Aspects of the UI of the tool which the experts find to be working well and promoting positive UX are assigned an issue rating of zero. Usability problems having no direct impact on the UX of the tool are assigned an issue rating of one. UI factors noted to be frustrating to users but not inhibiting them from completing their tasks are assigned an issue rating value of two. Usability issues identified by the experts to be major problems are rated to be in UX issue category three. Catastrophic issues resulting in users failing to complete the given tasks are assigned an issue value of four.

Overall, the experts rated rate Pastel UI to be attractive, no UX threatening issues were found with respect to the visual design of the application. On the Help function, it has been noted that the tool falls short of procedural aspects to inform users how they can perform a specific task. The help function does not inform the users when they get lost and need to know their current location and how to return to the main window. Such lack of informative makes it frustrating for users to interact with the tool.

Pastel error tolerance has been rated as a UX catastrophe, the application does not warn users of any potential error before the users make a mistake. This has negative impact on usability; it makes the users lose confidence in using the application. Overall, the experts found the tool to be familiar to the mental models and expectations of the users. Such familiarity factors promote confidence in the users when they recognise the aspects which they can match to their fore-knowledge and expectation.

Minor issues about the consistency of the application were noted, the application does not conform to the standard keyboard shortcuts expected by the users who use the keyboard for navigation. However, the application has a consistent design from one window to another. That makes it easy for the users to learn the application.

The visibility of system status factor during interaction with the application was found to be a major issue inhibiting attainment of positive UX. Users always want to know what is happening and what the results of a particular action are. Once, the users are unaware of what is going on, their whole experience is deterred. Thus, the developers need to keep the users apprised of progress in the task performance.

Users have overall control when interacting with the application and they can change the view mode which they want (switch between navigator, explorer) and they have the option to use the keyboard for interacting with the system. On the contrary, the tools lacks customisation options to suit the preferences of the users, users need to change font size, colour, and style to suit their needs. Another control issue noted is that once a task is in progress, users can not interrupt it when necessary.

It has been agreed that Pastel uses terminology that is common to the accounting field and avoids computer jargon. This, however, has a negative impact on UX for people who are not familiar with the accounting field. Terms like “batch” confuses users who do not know what it means in Pastel terms, thus, putting off their experience. Overall Pastel is predictable and users can get the results they expect from their actions.

6.7. UX issue list

The UX issue list describes UI aspects identified to have an impact on the UX of the tool in task performance, subjective questionnaire rating and expert review. An issue is defined as anything that has the potential to impede users from successfully completing a task or any UI aspect leading to users undesirable interaction with the tool causing a negative UX. In this

section, UX issues are identified, described, categorised and rated for their severity and recommendations for improvements proposed. Issues are rated based on UX severity rating criteria put forward by Tullis and Albert (2008) as follows:

Low: Any issue disturbing the participant but not contributing to task failure. The issue distracts the participant resulting in unsatisfactory interaction with the tool, participant frustration confusion and annoyance.

Medium: Any issue that indirectly contributes to task failure. The issue slows progress and productivity as the participant tries to find alternatives to overcome the issue. Overall, these issues reduce satisfaction and ease of use.

High: High priority issues are those which caused participants to fail to complete a given task. Such issues have a profound impact on UX and usability.

The following categories have been used to classify the issues; aesthetic design, visual aspects, navigation, feedback, control and terminology. Aesthetic and visual design issues are concerned with the general appearance and attractive presentation of the UI. Feedback issues relate to communication and confirmation messages from the system during the interaction of the user with the product. Terminology refers to names and labels used to identify UI components. Control issues address the default set values of the tool. Navigation issues are those that prevent users from moving from one window to another. Table 6.17 shows the identified UX issues for each task and proposed recommendations.

Table 6.17: UX issue list

UX Issue List by Task

Task	Pastel Xpress window	UI design issue	Category	Participants	Rating	Recommendation
Warm up	Main window	Icons too small, dull, not appealing	Aesthetics	P2, P3, P4, P6, P7, P8, P9	Low	Stick to previous versions icons design and styles
Task 1	Main	Participants failed to get the correct menu to navigate to the correct window	Navigation	P1, P2, P3, P4 , P5, P6, P9	High	Include clear icon for Setup User / Passwords on the icon options bar
Task 1	Setup User / Passwords	User failed recognise option for setting access rights	Navigation	P4, P6, P8, P9	High	Split the process of adding users and setting of user rights into different windows. Suggesting opening a user rights assignment window just after the user has been successfully added

Task 2	Edit Inventory	Inventory code field does not give message when participant enters code exceeding the required field size	Feedback	P3, P7, P8, P9	Low	Provide feedback message notifying users when they enter text exceeding the required text length in the inventory code field
Task 2	Edit Inventory	The label "Description" confuses participants	Terminology	P1, P2, P3, P5	Medium	Rename the label "Description" to "Name"
Task 2	Edit Inventory	Users failed to notice the "Preferred supplier" option	Navigation	P1, P2, P3, P4, P5, P6, P7, P9	Medium	Include the preferred supplier as a standalone tab
Task 2	Edit Inventory	No feedback message to confirm Inventory added successfully	Feedback	P3, P4, P7, P8, P9	Low	Provide users with message to inform users on completion of task
Task 3	Process supplier	Users did not like the use of "Close" command to save the document	Terminology	P1, P2, P4, P5, P6,	Low	Suggest use of "SAVE" or "OK" to save the document , "Close" to be used to exit the window
Task 3	Process supplier	No message to confirm document processing successful	Feedback	P3, P4, P7, P8, P9	Low	Provide users with message to inform users on completion of task
Task 3	Process supplier	The date section picks an outdated date	Control	P3, P4, P7, P8, P9	Medium	Date to pick current system date as default
Task 3	Process supplier	Note facility not easily recognised , Its use not known	Visual design	P7, P8, P9	Low	Placing the note facility visibly on the window, with a brief explanation of its purpose
Task 4	Edit Customer Accounts	The label "Description" confuses participants	Terminology	P1, P2, P3, P5	Low	Rename the label "Description" to " Name"
Task 4	Edit Customer Accounts	No feedback message to confirm customer added successfully	Feedback	P3, P4, P7, P8, P9	Low	Provide users with message to confirm success of the operation
Task 4	Edit Customer	Customer account code field does not give message when participant enters code exceeding the required field size	Feedback	P3, P7, P8, P9	Low	Provide feedback message notifying users when they enter text exceeding the required text length in the customer account code field
Task 5	Process cash book	The date section picks an outdated date	Control	P3, P4, P7, P8, P9	Medium	Date to pick system date as default

Navigation issues have prevented the majority of participants from successfully completing Task 1. Participants failed to find the option to navigate to the correct window to add users. Those who managed to find the correct window struggled to locate the menu for setting user

access level rights. Such an occurrence led to the issue being rated as high priority. Identified visual and aesthetic design issues do not have an impact on task accuracy; they only impact on the satisfaction, pleasure and enjoyment of the user on interacting with the application tool, hence, are rated a low UX priority issue.

A control issue identified is that the system does not pick the current system date in the cash book processing and on processing supplier documents. Although, this does not lead to task failure, the issue has been assigned medium priority. This is because posting a transaction with a wrong transaction date can result in significant imbalances in the financial reports. Thus, the participants must be cautious and remember to change the posting date, such memorability demands make the use of the tool, a cumbersome experience.

Lack of confirmation feedback upon task completion has been noted as another issue. Participants are always left wondering about whether the transaction was successfully committed. Feedback issues of this nature have been rated as low priority since they have no effect on performance and overall participant productivity.

Terminology issues noted resulted from participants getting confused due to label naming. Terminology, however, does not detract users from overall productivity, hence, terminology issues have been rated as low priority.

6.8. Summary

In this chapter findings from the study were presented. Preliminary survey results, user observation and expert review results have been analysed and interpreted. The findings are the basis for making conclusions which recommendations will be proposed.

CHAPTER 7: RECOMMENDATIONS AND CONCLUSION

7. Introduction

The purpose of this study was to propose metrics that can be used to evaluate the UI factors that impact on UX. The research focus was on the UX of a SMME-specific SAA commonly used in a typical developing country business environment. South Africa was chosen as one such country with an emerging economy and Pastel Xpress was selected as the dominant SAA to be investigated. The aim of this chapter is to consolidate the research findings by providing conclusions and recommendations to the identified problems and research objectives. The problem statement and research questions in Chapter 1 will be solved based on the knowledge gathered from the literature study and the experimental work. Both useful and usable recommendations are suggested to improve the UX of the tool based on evaluation results using the proposed metrics.

In this chapter the research questions and objectives are reviewed with regards to how they have been addressed. A conclusion on the findings is discussed. The conclusions are the basis from which the recommendations are made.

7.1. Research questions and objectives

In this section, findings on the research questions and related objectives stated in Chapter 1 are discussed.

7.1.1. Research question 1

What are the typical SMME accounting business processes in the developing countries environment?

Corresponding research objective:

To investigate the typical SMME accounting business processes in a developing country.

In the study, South Africa was chosen from among other developing countries for investigation. This research question was examined in Chapter 2. In-depth knowledge on the research question was gathered through a literature study and a preliminary questionnaire survey. The survey aimed at investigating typical accounting business activities in South African SMMEs. The following accounting activities were found to be common to SMMEs:

- Customer and Supplier documents processing;
- General Ledger processing;

- Cash Book processing;
- Inventory management;
- Preparation of financial reports.

7.1.2. Research question 2

How can the UX of an accounting tool be evaluated?

Corresponding research objective:

To examine existing UX evaluation methods to establish the applicable criteria for evaluating the UX of an accounting tool.

Through the literature study in Chapter 3, the research question 2 was addressed. A number of existing UX measurement methods and criteria were identified and discussed. The following methods were identified; *expert-based methods, performance-based methods and user opinion-based methods.* It was noted that, currently, there are no guidelines or metrics specifically meant for the design and evaluation of accounting systems. Based on the expertise of the researcher, the availability of resources and the stage of the product in its development life cycle, e*xpert review* and *contextual enquiry (user observations and post-test questionnaire)* were selected as appropriate criteria for evaluating the tool. These methods were chosen because they are relatively easy, need less time, are cost effective, and require no special equipment. Thus, Pastel Xpress 2009 was evaluated using these methods.

7.1.3. Research question 3

What are the UI factors that prevent SAA users from completing their tasks successfully with a satisfactory UX*?*

Corresponding research objective:

To determine the UI factors of Pastel Xpress 2009 that impede users from successfully completing their tasks and reduce overall positive UX of the tool.

The research objective was achieved through observation based context enquiry and expert reviews. The following aspects were concluded to be issues that hinder a positive UX and successful task completion.

- *Visual aesthetic design*

Visual aesthetic design did not have a direct impact on task accuracy and completion. The issue impacted on the UX of the tool. The participants commented that the Pastel Xpress icons are not visually appealing, they are too small and dull compared to prior versions of the same tool.

Recommendation: A suggested recommendation that will make the design appealing is the step of making the icons bigger and brighter to appeal to a positive UX. To avoid confusing the users, Pastel Xpress 2009 UI developers should be consistent with prior Pastel accounting UI visual designs.

- *Feedback*

During the context enquiry-based study, it was noted that the Pastel Xpress 2009 accounting tool does not give users feedback on task completion. For example, when adding an item to the database, the system does not inform the user whether the item has been successfully added on not. Another aspect that was lacking feedback that was noted is that when adding item / supplier / customer code. In cases, where the user enters characters which exceed the required field length, there is no message of any sort that communicates this to the user.

Recommendation: To keep the system users aware of the success of their actions, messages must be communicated to the result of the action(s) of the users.

- *Navigation*

Navigation issues prevented most of the participants from completing their tasks. This was evident during the Adding New User task. Most of the participants failed to find the option to navigate to the window for Setting-up User Account and Passwords. Still, those who struggled and managed to find the option, stumbled on setting the User Access Levels. On editing inventory, it was noted that the option for selecting preferred supplier was not clearly visible to the users.

Recommendation: The first suggestion is that an option for Setting-up User Accounts and Passwords must be clearly made present within all system navigation options (menu bar, icons bar, navigator and system explorer). Secondly, complex tasks need to be split. The process of setting up a new user and setting of access levels may be made accessible when split into different windows. A suggestion for improvement may be designing the UI so that a window for setting user access levels automatically opens after a user has been successfully

added. The preferred supplier option should be included as a stand-alone tab to avoid the clustering of objects in one window.

- *Terminology*

Issues relating to terminology problems include the use of the "CLOSE" command as a save option when processing supplier documents, customer documents and editing the inventory window. This design diverts from the consistent conventional design which users are used to. Another confusing term noted was use of the label "Description" when editing an inventory name, customer name and supplier name fields. Users try to give a description of the item instead of its name.

Recommendation: Suggest use of the conventional "SAVE" command instead of using "CLOSE". The label "Description" will be more meaningful more meaning to the users if replaced by the term "Name".

- *Control*

During cash book processing and processing of suppliers, the system does not pick the current date. This problem requires the users to constantly remember to change the dates. Such a requirement results in a cumbersome activity that causes user frustration and, hence, less UX.

Recommendation: On processing, the tool should pick the computer current date and time.

7.1.4. Main research question

What metrics can be used to evaluate UI factors impacting on the UX of a typical accounting tool used to support SMME accounting activities in a developing country?

Corresponding research objective:

To propose metrics to evaluate the UI factors that impact on the UX of a typical SMME-specific SAA used in a developing country business environment.

The main research question was addressed in Chapter 4 and the proposed metrics were tested evaluating Pastel Xpress 2009 accounting tool. The UX of Pastel Xpress 2009 was evaluated using the proposed metrics and the following conclusions were drawn.

- *Subjective satisfaction*

The participants rated Pastel Xpress to be pleasing to interact with, thought provoking and satisfactory in completing their tasks.

- *Consistence*

Overall, it can be concluded that the participants found the Pastel Xpress 2009 design to be consistent in the naming of commands, visual information architecture and consistent with the Microsoft Windows UI design standards. All the participants are running the system on a Microsoft Windows operating system environment.

- *Attractiveness*

Overall, the participants rated the Pastel Xpress 2009 UI, to be attractive, simple, clear and clean. The participants liked the choice of colours used and found them to be appropriate, welcoming and not harsh on their eyes. In conclusion, Pastel Xpress 2009 is attractive in promoting a positive UX.

- *Familiarity*

It was noted from the feedback of the participants that they had mixed experiences with respect to familiarity as presented in Chapter 6 Section 6.6.4. It was assumed that the differences in such user experiences could be attributed to factors like differences in age groups, accounting background and expertise in using the tool. Thus, in conclusion there has to be a balance in the Pastel Xpress 2009 design to make it feel familiar to users with different profiles and abilities.

- *Tolerance*

Pastel Xpress 2009 was found not to be lenient with users with regards to error warning and recovery. Users learn and explore a product by trial and error. Thus, Pastel Xpress makes it difficult for the users to freely discover the application interface due to fear of making costly errors, overall the tool fails to promote a positive UX.

- *System terminology*

Overall the participants indicated that Pastel Xpress 2009 interface design uses accounting context specific terms and avoid the use of computer jargon.

- *Predictability*

Pastel Xpress 2009 interface design is found to be predictable. The participants always get what they anticipated from their system action input. This predictability increases the confidence and enjoyment of the users during and after using the application.

- *Feedback*

The following issues with respect to feedback have been found on Pastel Xpress 2009. The tool does not provide users with feedback while they interact with the application. It leaves the users wondering whether the transaction has posted or it is still processing. At times the participants think the computer has frozen. Such design has a negative impact on the user experience.

- *Help*

The findings reveal that the Help function of Pastel Xpress 2009 is not useful.

- *Control and freedom*

The participants indicated they were in control in navigating and they had a variety of navigating options (menu list, icons and keyboard shortcuts). Users can customise navigation options through the system navigator, system explorer or general Pastel view. Such control capabilities has positive impacts on the overall UX.

In conclusion, the proposed metrics have proved to be both useful and usable in evaluating the UI and the variety of UI design factors that impact on the UX of the tool.

7.2. Recommendations for improving UI design for UX

The following recommendations will be proposed to improve Pastel Xpress 2009 UX. The recommendations are based on the conclusion from the stated findings in Section 7.1.

7.2.1. Familiarity

The participants indicated they have mixed experiences on how familiar the tool is based on their accounting background and in relation to other computer applications they have used. This difference could be attributed to the differences in their age groups, computer experience and expertise in using Pastel accounting. However, it cannot be justifiably concluded that such a response is due to these stated factors. Further research on the relationship between the tools familiarity and these factors will make the results more credible.

It is suggested that to improve on the familiarity of the UI of the tool, Pastel accounting developers should consider the preferences of the majority of the users. As noted in Chapter 6, the participant general demographic data revealed that females dominate in the SMME accounting sector in developing countries. Most of the participants are in the 21 -30 years or above 41 years. Thus, it is important that Pastel accounting UI developers should centre their design directions on such user profiles, and have the product appealing to its intended users.

7.2.2. Tolerance

It was revealed that Pastel Xpress 2009 lacks lenience on the user errors and does not warn users about possible errors before they occur. The following improvements are proposed to the UI of the application to enhance its usability and UX:

- The system should warn users if they are about to make an error using techniques such as informing users of the potential errors an action may cause and asking for user confirmation before users perform the erroneous action;
- On error, the system should tell users the action needed for them to recover from the encountered error;
- If an error is detected in a data entry field, the system should place the cursor in that field or highlight where the error has occurred.

7.2.3. Feedback

The system does not give feedback to the users on task completion status. It is proposed that feedback messages are incorporated into the UI design of the tool. Whenever, there is an observable delay in task processing users should be kept informed on the systems progress. Upon task completion or saving a record, the application should give a message confirming to the user that the record was successfully saved or not.

7.2.4. Help

Overall the participants indicated the help function to be useless. The following aspects are proposed to the design of the Help function to make it helpful to the users and to improve on a positive UX.

- The Help function should tell the users what they can do with the system;
- The Help function should be descriptive in informing users what a UI component is meant to perform;

- The Help function should be procedural in telling users how to do a specific task;
- The Help function should provide interpretive information on possible reasons why something has happened;
- The help function should provide navigational information on where to go next to complete a specific task and the current location in task performance.

7.3. Significance of research

This study outlines the UI factors that impact on the UX of a SAA designed to support the accounting activities for SMMEs operating in developing countries. The proposed metrics aim to benefit small business accounting tools developers who need to design their tools for a positive UX. It is evident from the Pastel Xpress case study findings that its UI is attractive, predictable, satisfactory, consistent easy to navigate and its terminology matches the intended users of the application. However, it has been found that Pastel lacks error tolerance, its help function is helpless, the application is unfamiliar to first time users and it lacks appropriate feedback to inform the users of the system status.

Thus, the proposed metrics can be applied by the application developers to make the accounting tools easier to interact with, informative, familiar and provide adequate help to the users. The proposed directions if followed will improve the UX of the tool.

7.4. Problems and limitations encountered

A number of problems were encountered during this research. The initial problem was a lack of literature on guidelines specific for the design of accounting tools UIs. Literature on general UI design guidelines was used and applicability of the guidelines was validated in the research experiment. The research progress suffered due to low questionnaire response during the preliminary study investigating the typical SMME accounting business processes in developing countries. To address this problem, findings from the questionnaire were collaborated with available literature on typical SMME accounting activities Another problem encountered was of getting a large sample of Pastel accounting users to participate in the study. Due to the limitation of resources such as time a compromise was reached and the study had to progress with the available resources. It was difficult to locate double experts in both accounting and user experience to evaluate the UX of the tool.

7.5. Recommendations for future research

User experience is an emerging field of research and its importance cannot be understated. Any product developer intending to have an appealing product should consider and improve on the factors that impact on the UX and usability of it. This research is limited to a single SAA, Pastel Xpress 2009, and a small sample size of participants were involved in the evaluation activity.

The following needs to be done to improve on these research findings for the UI factors that impact on Pastel Xpress UX and how they can be evaluated. Future research should investigate whether the proposed metrics can be generalised to other accounting tools. Recruiting a larger sample size, with different levels of accounting expertise, will improve on the validity of the proposed metrics. The metrics need to be further tested by a comparative study using at least three SAAs used in SMMEs in developing countries. Further UX evaluation criteria like-time bound performance measures will reveal more UI factors that impact on the UI of the tool and make them more usable. Employing performance based usability testing will reveal other aspects of the UX of the tool. It is important that future research should focus on UI preferences for developing countries user profiles.

The mentioned future research aspects will improve the ease of use, user friendliness, usability and UX of the accounting tools used in developing countries. Such usable tools will benefit SMMEs sustainability in the highly agile and dynamic emerging economy environment.

REFERENCES

A3consulting. (2006). *Enterprise Risk Management for SMMEs.* A Research Report prepared for the Institute of Risk Management of South Africa.

African Outlook, (2004 -2005). *African Economic Outlook*. Retrieved July 16, 2008, from the World Wide Web: http://www.oecd.org/document/11/0,3343,en_2649_15162846_34808779_1_1_1_1,00.html

Baker, F. (2003). *The South African Labour Market.* Pretoria : Van Schaik.

Banati, H., Bedi, P., & Grover, P. (2006). Evaluating Web Usability from the User's Perspective. *Journal of Computer Science 2 (4)* , 314-317.

World Bank. (2006). *Information and communications for development: global trends and policies* . Washington, D.C: World Bank.

Bannock, B., & Peacock, A. (1989). *Government and Small Business.* London: Paul Chapman.

Barnum, C. (2002). *Usability Testing and Research.* New York: Longman.

Bevan, N. (2008). Classifying and selecting UX and usability measures. *Meaningful Measures: Valid Useful User Experience Measurement.* COST294-MAUSE Workshop.

Berry A, Von Blottnitz M., Cassim R, Kesper A, Rajaratnam, van Seventer, D.E. (2002). *The Economics of SMMEs in South Africa* . Trade and Industrial Policy Strategies .

Bias, R. (1994). The Pluralistic Usability Walkthrough: Coordinated Empathies. In J. Nielsen, & R. Mack (eds), *Usability Inspection Methods* (pp. 63-76). John Wiley.

Bolton Report . (1971). *Report of the Committee of Enquiry on Small Firms.* Cmnd 4811,London: HMSO.

Blaxter, et. al. (2001). *How to Research (3rd edn).* Buckingham: Open University Press.

Bless, C., & Higson-Smith, C. (2000). *Fundamentals of social research methods.* Lansdowne: Juta.

Bridge, S., O'Neill, K., & Cromie, S. (2003). *Understanding Enterprise, Entrepreneurship and Small Business.* London: Palgrave Macmillan.

Brinkman, R. L., & Brinkman, J. E. (2002). Corporate power and the globalization process. *International Journal of Social Economics* , 730-752.

Brooger. (2009). *Small and Medium Enterprises (SMEs) Role in Economic Growth*. Retrieved on May 23, 2009 from the World Wide Web: http://brooger.com/business-finance-money.php/small-and-medium-enterprises-smes-role-in-economic-growth

Brouthers, e. a. (1998). Driving blind: strategic decision-making in small companies. *Long Range Planning* , 130–138.

Burrell, G., & Morgan, G. (1979). *Sociological paradigms and organizational analysis.* London: Heinemann.

Carroll, J. M. (2009). Human Computer Interaction (HCI). *Interaction-Design.org.* Retrieved on September 15, 2009, From the World Wide Web. *http://www.interaction-design.org/encyclopedia/human_computer_interaction_hci.html*

Carroll, J., & Kellogg, W. Artifact as Theory Nexus: Hermeneutics Meets Theory-Based Design. *CHI '89.* ACM.

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation behavior* . New York : Cambridge University Press.

Chalera, C. S. An Impact Analysis of South Africa's National Stratergy for the Development and Promotion Of SMMEs. University of Pretoria, Pretoria . Retrieved on July 02, 2009, From the World Wide Web. *http://upetd.up.ac.za/thesis/available/etd-05022007-102936/unrestricted/00front.pdf*

Chandra, V., Moorty, L., Nganou, J.P., Rajaratnam, B., & Schaefer, K. (2001). *Constraints to Growth and Employment in South Africa Report #2: Evidence from the Small, Medium and Micro Enterprise Firm Survey. Informal Discussion Paper #15.* Washington DC: World Bank.

Chen, J. (1998). *Economic Effects of Globalization.* Brookfield, VT: Ashgate Publishing.

Clarke, G., Kaplan, D., & Ramachandran, V. (2006). The investment climate for micro-enterprises in South Africa. *TIPS Conference on Accelerated and Shared Growth in South Africa: Determinants, Constraints and Opportunities.* Johannesburg: TIPS.

Cloete et. al. (2002). Small Businesses' Acceptance And Adoption of E-Commerce In The Western-Cape Province of South-Africa. *Electronic Journal On Information Systems In Developing Countries* , 10(4), 1–13.

Constantine, L. L. (2006). Trusted Interaction: User Control and System Responsibilities in Interaction Design for Information Systems . *Advanced Information Systems Engineering: 18th International Conference* . Luxembourg: Lab:USE .

Cooper, D., & Schindler, P. (2008). *Business Research Methods (10th edn).* Boston : MacGraw-Hill Irwin.

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches.* Thousand Oaks, CA: Sage.

Daniels et. al. (2007). A Framework for Evaluating Usability of Clinical Monitoting Technology. *Journal of Clinical Monitoring and Computing* , 323–330.

Davis, F. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology.* MIS Quarterly .

de Villiers, M. (2005). Three Approaches as Pillars for Interpretive Information Systems Research: Development Research, Action Research and Grounded Theory . *South African Iinstitute of Computer Scientists and Information Technologists on IT (SAICSIT)*, (pp. 142-151).

Denning, S., Hoiem, D., Simpson, M., & Sullivan, K. (1990). The value of thinking-aloud protocols in industry: A case study at Microsoft Corporation. *Proceedings of the Human Factors Society 34th Annual Meeting* (pp. 1285-1289). Santa Monica, CA: HFES.

Desmet, P. M., & Hekkert, P. (2007). Framework ofproduct experience. *International Journal of Design* , 57-66.

de Kock, E., van Biljon, J.&Pretorius, M., (2009). Usability evaluation methods: mind the gaps. *ACM International Conference Proceeding Series Proceedings of the 2009 Annual Research Conference of the South African Institute of Computer Scientists and Information Technologists* (pp. 122-131). Vanderbijlpark, Emfuleni, South Africa : ACM New York, NY, USA .

Dix et al. (2004): *Human-Computer Interaction*. 3rd Edn, Prentice Hall.

Doost, R. K. (1999). Computers and accounting: where do we go from here? *Managerial Auditing Journal Volume: 14, Number: 9* , 487-488.

DTI. (2004). Department of Trade and Industry. *"Annual review of Small Business in South Africa"* . SEDA.

Fairhead, N. (1990). How to get value from your office systems. *Office & Information Management International* , 10-14.

Faul, M. A. (1997). *Accounting : an introduction (5th edn).* Durban : Butterworths.

Galliers, R. (1991). Choosing Appropriate Information Systems Research Approaches: A Revised Taxonomy. *Information Systems Research: Contemporary Approaches and Emergent Traditions* , 327-34.

Gephart, R. (1999). Paradigms and research methods. *Research Methods Forum, Vol. 4* .

Gilbert, A. (2003). *Business apps get bad marks in usability.* Retrieved on Spetember 06, 2008, From the Wold Wide Web. http://news.cnet.com/2100-1017- 980648.html

Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research.* New York: Aldine Publishing Company.

Glesne, C., & Peshkin, A. (1992). *Becoming qualitative researchers: An introduction.* New York: Longman .

Goddard, P. H. (2009). *User Experience Metrics: Connecting the language of UI design with the language of business.* Human Factors International White Paper.

Hassenzahl, M., & Roto, V. (2007). Being and doing: A perspective on User Experience and its measurement . *Interfaces, 72* , 10-12.

Hassenzahl, M., & Tractinsky, N. (2006). User Experience - a Research Agenda. *Behaviour and Information Technology, Vol. 25, No. 2* , 91- 97.

Hertzum, M. (2000). Measuring usability: are effectiveness, efficiency, and satisfaction really correlated? *Conference on Human Factors in Computing Systems Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 345 - 352). The Hague, The Netherlands: ACM.

Hess, W. (2009, January 12). 10 Most Common Misconceptions About User Experience Design. Retrieved on March 23, 2009, From the World Wide Web. *http://mashable.com/2009/01/09/user-experience-design*

Hevner, A., March, S., Park, J., & Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly 28(1)*, (pp. 75-105.).

Hofstee. (2006). *Constructing a Good Dissertation* . Sandton, South Africa: EPE.

Hutton, P. (1990). *Survey Research for Managers: How to Use Survey in Management Decision Making.* Basingstoke: Macmillan Press.

Huysamen, G. (1994). *Methodology for the social and behavioural sciences.* Halfway House.

ISO. (2008). *Ergonomics of human system interaction - Part 210 Human-centred design for interactive systems.* Switzerland: International Organization for Standardization (ISO).

Iyanda, O., & Ojo, S. O. (2008). Motivation, influences, and perceived effect of ICT adoption in Botswana organizations. *International Journal of Emerging Markets* , 311 - 322.

Jih et. al., (1989). The Effects of Relational and Entity-Relationship Data Models on Query Performance of End Users. *International Journal on Man-Machine Studies, Volume 31, Number 3* , 257-267.

Kapurubandara, M., & Lawson, R. (2006). Barriers Adopting ICT and E-commerce with SMEs in Developing Countries: An Exploratory Study in Sri Lanka. Adelaide: CollECTeR.

Kieschnick, T. (2008). *User Experience Metrics* . Retrieved April 11, 2009, From the World Wide Web. http://timiti.blogspot.com/2008/03/user-experience-metrics.html

KingResearch. (2008). *Business Benefits of Automating Business Services: An In-depth Customer Survey*. Retrieved November 13, 2009, From the World Wide Web. https://h10078.www1.hp.com/bto/download/king-bsa0508.pdf

Kneale, M., & Kneale, W. (1962). *The Development of Logic.* London, UK: Oxford University Press.

Knox, K. T. (2004). A researcher's dilemma - Philosophical and methodological pluralism. *Electronic Journal of Business Research Methods* (pp. 119 – 128). Retrieved October 13, 2008, From the World Wide Web. http://www.ejbrm.com/vol2-issue2/vol2-issue-art7.htm

Krauss, S. E. (2005). *Research Paradigms and Meaning Making: A Primer.* The Qualitative Report Volume 10. Retrieved April 09, 2009, From the World Wide Web. http://www.nova.edu/ssss/QR/QR10-4/krauss.pdf

Kuechler, W., & Vaishnavi, V. (2008). The Emergence of Design Research in Information Systems in North America . *Journal of Design Research, Vol. 7, No. 1* , 1-16.

Launder, T. (1995). *The Trouble with Computers: Usability and Productivity.* MIT Press.

Law, E., Roto, V., & Hassenzahl, M. (2009). Understanding, Scoping and Defining User eXperience: A Survey Approach. *ACM SIGCHI conference on Human Factors in.* CHI'09.

Leedy, P., & Ormrod, J. (2001). *Practical research: Planning and design. 7th ed.* New Jersey: Prentice-Hall.

Li et. al., (2007). OASAM - An Open and Adaptive Software Architecture Model for Service-Oriented Application in Dynamic Netwotk Environments. *Journal of Integrated Design and Process Science* , 107-118.

Lombardo, S. V., & Condic, K. S. (2000). Empowering users with a new online catalog . *Library Hi Tech* , 130-141.

March, S., & Smith, G. (1995). Design and Natural Science Research on Information Technology. *Decision Support Systems* , 251 - 266.

Mathews, D. (2008). *Usability as an ERP Selection Criterion* : Bitpipe. Retrieved July 18, 2008, From the World Wide Web. http://viewer.bitpipe.com/viewer/viewDocument.do?accessId=7788041

Mauro, C. L. (2008). *2007 Annual User Experience Design Review.* Retrieved July 15, 2009, From the World Wide Web. http://www.mauronewmedia.com/blog/2008/10/2007-annual-user-experience-design-review/

Maxwell, J. A. (2004). Causal explanation, qualitative research and scientific inquiry in education. *Educational Researcher 33(2)* , 3-11.

McGrath, S. (2005). The existing state of knowledge about very small and micro enterprises in South Africa. In S. McGrath, *Skills development in very small and micro enterprises* . Cape Town: HRSC Press.

Meigs, W. B., & Meigs, R. F. (1981). *Accounting, the basis for business decisions.* New York: McGraw-Hill.

Merrie, B., Moor, J., & Nelson, J. (2009). *The Logic Book 5th edn.* New York: McGraw-Hill.

Microsoft. (1999). *Microsoft User Experience.* Washington DC. Microsoft Press.

Morville, P. (2002). Enermies of usability. *Semantic Studios* . Retrieved May 21, 2009, From the World Wide Web. http://semanticstudios.com/publications/semantics/000009.php

Morville, P. (2004, June 12). User Experience Design. *Semantic Studios* . Retrived May 21, 2009, From the World Wide Web. http://semanticstudios.com/publications/semantics/000029.php

Mouton, J. (2001). *How to succeed in your Master's and Doctoral studies: A South African guide and resource book.* Pretoria: Van Schaik.

Multi-method research: an empirical investigation of object-oriented technology. (n.d.).

Myers, B. A. (1998). A Brief History of Human Computer Interaction Technology. *ACM interactions* , 44-54.

Myers, B. (1994). Challenges of HCI design and implementation. *Interactions , Vol.1, No. 1* , 73-83.

Myers, M. (1999). Investigating Information Systems with Ethnograpic Research. *Communications of AIS, vol 2, Article 23* .

Nachmias, D., & Nachmias, C. (1992). *Research Methods in the Social Sciences (4th edn).* London: Edward Arnold.

Nickerson, R. (1985). *The Teaching Of Thinking* . Hillsdale, New Jersey London: Erlbaum Associates.

Nielsen, J. (1994). Heuristic evaluation. In J. Nielsen, & R. Mack, *Usability Inspection Methods.* New York, NY: John Wiley & Sons.

Nielsen, J., & Levy, J. (1994). Measuring usability: preference vs. performance. *Communications of the ACM Volume 37 , Issue 4* (pp. 66 - 75). New York, NY, USA: ACM.

Nielsen, J. (1993). *Usability engineering.* Boston, MA: AP Professional.

Nishida, T. (2007). *Conversational Informatics: An Engineering Approach.* England: John Wiley & Sons Ltd.

Nngroup. (2009). *User Experience*. Retrieved November 13, 2009, From the World Wide Web: http://www.**nngroup**.com/about/userexperience.html

Ntsika. (2001). *State of Small Business in South Africa. Policy and Research Division.* Pretoria: Ntsika Enterprise Promotion Agency.

Nurkka, P. (n.d). *User Experience Evaluation Based on Values and Emotions*. Nokia Research

Oates, B. J. (2006). *Researching Information Systems and Computing.* London : Sage Publications.

Oboler, A. (2008). *Does the purchase and installation of ERP software represent investment in an "instant" legacy system?* Retrieved on April 20, 2008, From the World Wide Web: http://www.comp.lancs.ac.uk/~oboler/LEGACY2.DOC

Pastel. (2009). *Pastel Accounting Xpress 2009. The Pastel Acounting package suitable for small busineses* . Retrieved October 22, 2009, From Softline Pastel : http://www.pastel.co.za/accounting_products/Pastel-Xpress.asp

Partala, T., & Kangaskorte, R. (2009). The Combined Walkthrough: Measuring Behavioral, Affective, and Cognitive Information in Usability Testing. *Journal of Usability Studies* , 21 - 33.

Perry, W. E. (1989). *Handbook of diagnosing and solving computer problems.* Blue Ridge Summit: PA.

Pierotti, D. (2000). Heuristic evaluation -- a system checklist. Xerox Corporation

Porter, N. (2005). *Inductive Reasoning or Induction.* United States: Kessinger Publishing .

Potts, C. (1993). Software-Engineering Research Revisited. *IEEE Software vol. 10, no. 5* , 19-28.

Pretorius, M. C., Calitz, A. P., & van Greunen, D. (2005). The Added Value of Eye Tracking in the Usability Evaluation of a Network Management Tool. *Proceedings of the 2005 annual research conference of the South African Institute of Computer Scientists and Information Technologists (SAICSIT)*. White River, South Africa.

Procter, R. N., & Williams, R. (1996). Beyond design: Social learning and computer supported cooperative work: Some lessons from innovation studies. In Shapiro et al. (eds), *The Design of Computer-Supported Cooperative Work and Groupware Systems.* Elsevier Science.

Punch, K. (1998). *Introduction to Social Research. Quantitative and Qualitative Approaches.* London: Sage.

Reiss, E. (2009). A definition of "user experience". *FatDUX Desinging valuable User eXperiences* . Retrived on October 10, 2009, From the World Wide Web: http://www.fatdux.com/blog/2009/01/10/a-definition-of-user-experience/.

Richter, J. (2004). Human-Computer Interaction. *DeepaMehta*. Retrieved on February 16, 2009, From the World Wide Web: http: http://www.deepamehta.de/docs/hci.html

Robson, C. (1993). *Real world research: a resource for social scientists and practitioner researchers.* WileyBlackwell.

Rogerson, C. M. (2008). Tracking SMME Development in South Africa: Issues of Finance, Training and the Regulatory Environment . *Urban Forum* , 61-81.

Rogerson, C. (1999). Small Enterprise Development in Post-apartheid South Africa: Gearing up for Growth and Poverty Alleviation. In K. King, & S. McGrath, *Enterprise in Africa: Between Poverty and Growth* (pp. 83-94). London: IT Publications.

Rogerson, C. (2004). The Impact of the South African Government's SMME Programmemes: a ten year review (1994 – 2003). *Development Southern Africa, 21(5).*

Roto, V. (2006). *User Experience Building Blocks*. COST294-MAUSE . Retrieved on July 17, 2009, From the World Wide Web: *http://research.nokia.com/files/UX-BuildingBlocks.pdf* .

Roto, V., Obrist, M., & Väänänen-Vainio-Mattila, K. (2009). *User Experience Evaluation – Do You Know Which Method to Use*? CHI 2009 ~ Special Interest Groups. Boston, MA, USA.

Roto, V., Vaananen-Vaino-Mattila, K., & Hassenzahl, M. (2008). *Now Let's Do It in Practice: User Experience Evaluation Methods in Product Development*. CHI'08. Florence Italy: ACM.

Roy, M. C., Dewit, O., & Aubert, B. (2001). The impact of interface usability on trust in Web retailers. *Internet Research: Electronic Networking Applications and Policy.Volume: 1 Number: 5* , 388-398.

Rozanski, E. P., & Haake, A. R. (2003). The many facets of HCI. *Conference On Information Technology Education Proceedings of the 4th conference on Information technology curriculum* (pp. 180 - 185). New York, NY, USA: ACM .

Rubin, J., & Chisnell, D. (2008). *Handbook of usability testing : how to plan, design, and conduct effective tests* . Indianapolis: Wiley Pub.

Rubinoff, R. (2004, April 21). *How To Quantify The User Experience.* Sitepoint. Retrieved October 5, 2009, From the World Wide Web. http://www.sitepoint.com/article/quantify-user-experience

Sage, A. (1992). *Systems engineering.* John Wiley & Sons Ltd.

Saunders et al. (2003). *Research Methods for Business Students (3rd Edition).* Harlow: Pearson Education Limited.

Saunders, M., Lewis, P., & Thornhill, A. (2003). *Reseach Methods for Business Students.* Great Britain : Pitman Publishing .

Sauro, J., & Kindlund, E. (2005). A method to standardize usability metrics into a single score. *Proceedings of CHI 2005* (pp. 401-409). New York, NY: ACM.

Schaeken, W. (2000). *Deductive Reasoning and Strategies* . Mahwah, New Jersey London : Lawrence Erlbaum Associates.

Schmid et. al. (2001). Towards the ESociety:E-Commerce, E-Business, E-Government. Zurich, Switzerland.

Scholtz, J. (2006). Metrics for evaluating human information interaction systems. *Interacting with Computers 18(4):* , 507-527.

Sharp, H., Rogers, Y., & Preece, J. (2007). *Interaction Design: beyond human computer interaction.* John Wiley & Sons.

Shneiderman, B. (1998). *Designing the user interface: Strategies for effective human-computer interaction.* Reading, MA: Addison-Wesley.

Six, J. (2009, October 19). Usability Testing Versus Expert Reviews. *UXmatters* . Retrieved November 14, 2009, From the World Wide Web. http://www.uxmatters.com/mt/archives/2009/10/usability-testing-versus-expert-reviews.php.

Smith, J. K., & Heshusius, L. (1986). Closing down the conversation: The end of the quantitative–qualitative debate among educational inquires . *Educational Researcher 15(1),* , 4-12.

Stake, R. (1995). *The art of case research.* Thousand Oaks, CA: Sage Publications.

Stefani, O. (2005). Cognitive Ergonomics in Virtual Environments: Development of an Intuitive and Appropriate Input Device for Navigating in a Virtual Maze. *Applied Psychophysiology and Biofeedback* , 259-269.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research.* Thousands Oaks, CA: Sage Publications.

Sutton, C. N., & Beth, J. (2007). *The Role of Financial Services Sector in Expanding Economic Opportunity. Coporate and Social Responsibility lnitiative Report No.19.* Cambridge: Havard University.

Sward, D. and Macarthur, G. (2007). Making User Experience a Business Strategy. Proc. of *Towards a UX Manifesto*, COST294-MAUSE workshop, Law, E.Vermeeren, A., Hassenzahl, M. & Blythe, M. (Eds.).

TerreBlanche, M., & Durrheim, K. (1999). *Research in practice: Applied methods for the social sciences.* Cape Town: UCT Press.

Toshihiro, K. (2008). Usability Evaluation Based on International Standards for Software Quality Evaluation . *NEC Technical Journal* .

Trochim, W. (2000). What is Research Design? *Research Methods Knowledge Base*. Retrieved on June 3, 2008, From the World Wide Web: http://www.socialresearchmethods.net/kb/desintro.php

Tullis, T., & Albert, B. (2008). *Measuring the User Experience: Collecting, Analyzing, and Presenting Usability Metrics.* Morgan Kaufmann.

Usabilityhome. (n.d). *Usability Evaluation Methods* . Usability Evaluation. Retrieved July 16, 2009, From the World Wide Web. http://www.usabilityhome.com/

UXnet. (2009). *User Experience*. Retrieved on July 27, 2009, From the World Wide Web: http://www.uxnet.org

van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy.* Abany, NY: State University of New York Press .

Venable, J. (2006). A Framework for Design Science Research Activities. *Information Resource Management Association Conference.* Washington Washington, DC, USA.

Wardlow, G. (1989). Alternative modes of inquiry for agricultural education. *Journal of Agricultural Education* , 2-7.

Wharton, C. E. (1994). The Cognitive Walkthrough Method : A Practitioner's Guide. In J. Nielsen, & R. Mack (Eds), *Usability Inspection Methods.* New York: Wiley.

Wikipedia. (2009). User experience design. Retrieved on October 23, 2009, From the World Wide Web: *http://en.wikipedia.org/wiki/User_experience_design*

Wood et. al. (1999). Multi-method research: an empirical investigation of object-oriented technology. *Journal of Systems and Software Volume 48 , Issue 1* , Elsevier Science Inc.

World Bank. (2006). *South Africa: Enhancing the Effectiveness of Government in Promoting Micro, Small and Medium Enterprise.* Report for the Department of Trade and Industry, Pretoria.

Yin, R. (2008). *Case Study Research: Design and Methods (Applied Social Research Methods).* Sage Publications .

APPENDIXES

Appendix A: Pilot survey questionnaire

Dear Participant, This questionnaire forms part of a postgraduate research project. The purpose of the research project is to investigate user interface design factors that impact on user experience for Software Accounting Application tools used to support accounting activities in Small Medium and Micro Enterprises (SMMEs) which operate in developing countries business environment. The aim of this questionnaire is to gain knowledge on typical accounting business processes common in developing countries SMMEs. In this case, South Africa is used as an example of a developing country. The research aims to propose user interface evaluation criteria to improve on the accounting application packages in terms of user friendliness, simplicity and ease of use.

The data collected in this questionnaire will be used for research purposes only and will in no way be linked to your personal identity. We request that you answer every question to the best of your knowledge. Your input and time spend on answering this questionnaire is highly valued and greatly appreciated. Should you have any questions you may contact the masters candidate, Mr Job Mashapa at Job.Mashapa@nmmu.ac.za or the study leader, Ms Darelle van Greunen, Darelle.vanGreunen@nmmu.ac.za.

1. Details of the organisation

Please answer the following questions with regards to your organisation.

1.1. What is the appropriate number of staff in your organisation?

Less than 10 ☐ Between 10 and 49 ☐

Between 50 and 250 ☐ Above 250 ☐

1.2. What is the legal status of your organisation?

Proprietor ☐ Cooperative ☐ Close corporation ☐

Private Company ☐ N/A ☐

1.3. Please indicate where your organisation is located

Eastern Cape ☐ Gauteng ☐ Free State ☐ Limpopo ☐

KwaZulu-Natal ☐ North-West ☐ Mpumalanga ☐ Northern Cape ☐

Western Cape ☐ Not in Africa ☐

Africa but not in South Africa ☐

1.4. What is the main business activity for your organisation (More than one can be selected)?

Agriculture	☐ Education	☐ Financial Services	☐ ICT	☐
Manufacturing	☐ Mining	☐ Medical Health Care		☐
Retail	☐ Recruitment and Training			☐
Other	☐ Transport, Travel and Tourism			☐

1.5. If answer to 1.4 above is OTHER please give details which best describe your firm

1.6. How does your organisation record and keep track of business transaction of financial nature (More than 1 can be selected)

Automated (Commercial Accounting Package)	☐
Manual (Pen and Paper)	☐
Automated (Spread Sheet e.g Excel, Word processor e.g Ms Word	☐
No system of any sort	☐

1.7. If using commercial Accounting Package: What is the name of the system that you use?

1.8. Please select customer documents that your organisation processes (More than one can be selected)

Credit Notes	☐ Debit Note	☐ Invoices	☐
Sales Orders	☐ Sales Quotation	☐ Time and Billing	☐
Other	☐ None	☐	

1.9. If your answer to 1.8 above is OTHER please specify

1.10. What transactions does your organisation record in the cash book?

No cash book	☐ Payments	☐ Receipts	☐ Other	☐

1.11. If your answer to 1.10 above is OTHER please specify

1.12. Please select supplier documents that your organisation processes

Credit to supplier ☐ Goods Received Note ☐ Purchase orders ☐

Return Debits ☐ Supplier invoices ☐ None ☐

Other ☐

1.13. If your answer to 1.12 above is OTHER please specify

1.14. Which of the following accounting functions does your organisation keep record of?

Accounts Payable ☐ Accounts Receivable ☐ Inventory Control ☐

Payroll ☐ Point of Sale ☐ Other ☐

1.15. If your answer to 1.14 above is OTHER please specify

1.16. Will you be willing to participate in a User Interface Evaluation activity?

Yes ☐ Need clarification on user interface evaluation ☐ No ☐

1.17. If your answer to above is YES or Need clarification on user evaluation please fill in your name, contact number, email or address below

2. Biographical Information

Please complete the following details with respect to yourself.

BIOGRAPHICAL INFORMATION									
Instructions: Mark your selection with an X in the relevant box									
2.1. Gender	Female			Male					
2.2. Home language	English		Xhosa		Afrikaans		Other		
2.3.If answer to above is other please specify:									
2.4.Age group (Years)	Less than 20		20-30		31 - 40		41 and above		
2.5.Please indicate your highest level of education									
Less than Matric (Grade 12)		Matric (Grade 12)		Degree/Diploma		Postgraduate		Other	
2.6.If answer to 2.5 is OTHER please specify									
2.7.Please select a category which describes your work profession									
Finance/ Accounting	Information Technology	Sales and marketing	Human Resources	Customer relations					
Production / operations	Administration	Research and development	Purchasing / Procurement	Other					
2.8.If answer to 2.7 is OTHER please specify									
2.9.How often do you use a computer									
Daily		Weekly		Monthly		Once or twice a year		Never	
2.10. Do you have access to a computer when you are at home?				Yes		No			
2.11. Have you ever received any accounting training?				Yes		No			
2.12. If Yes please select where you received training									
College/ University		Secondary School		Work		Other			
2.13. If answer to above is other please specify:									
2.14. Which of the following accounting packages / software have you used for tracking accounting transactions (more than one can be selected)?									
Accountmate	SAP	Pastel	QuickBooks	Turbo Cash					
Microsoft Excel	MyOB	Automate	Other	None					
2.15. If Other please specify name of package:									
2.16. How often do you use such accounting tools									
Daily		Weekly		Monthly		Once or twice a year		Never	
2.17. Please tick the computer applications you have used (more than one can be									

selected)				
Accounting packages (e.g. pastel)	Internet and E-mail	Presentation applications (e.g. PowerPoint)	Spreadsheets (e.g. Excel)	Statistics packages (e.g. SPSS)
Microsoft Word	Other			
2.18. If answer to 2.17 above is OTHER please give brief details:				

3. Attitude towards computer use

Please rate the strength of your agreement concerning how you feel about computers using the 5 point scale ranging from strongly disagree (1) to strongly agree (5).

Attitude	Rating				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
3.1. I find working with computers very easy					
3.2. I seem to have difficulties with most applications I have tried to use					
3.3. Computers scare me					
3.4. I enjoy working with computers					
3.5. Using computers make me more productive					
3.6. I often have difficulties when trying to learn how to use a new computer package					
3.7. Most of the computer packages i have used have been easy to use					
3.8. Computer terminology confuses me					
3.9. Sometimes when using a computer things seem to happen and I don't know why					
3.10. I consider myself a skilled computer user					
3.11. When using computers I fear that I might press the wrong button and damage the system					
3.12. I always seem to have problems when trying to use computers					
3.13. I find it difficult to get computers do what i want them to do					
3.14. Computers are too complicated for me					
3.15. How would you rate your experience with computers ?					

Appendix B: Pilot survey questionnaire results

1.0. Organisational data participant's responses frequency tables

Q1-1**:** What is the appropriate number of staff in your organisation?

N=46		
Size of organisation	**Number of participants**	**Percentage**
Less than 10	31	67%
Between 10 and 49	9	20%
Between 50and 250	6	13%
Above 250	0	0%

Q1-2**:** What is the legal status of your organisation?

N=46		
Organisation legal status	**Number of participants**	**Percentage**
Proprietor	12	26%
Cooperative	0	0%
Close corporation	18	39%
Private Company	10	22%
N/A	6	13%

Q1-3**:** Please indicate where your organisation is located.

N=46		
Organisation's location	**Number of participants**	**Percentage**
Eastern cape	23	50%
Gauteng	4	9%
African not SA	3	7%
Western Cape	16	35%

Q1-4: What is the main business activity for your organisation (More than one can be selected)?

N=46		
Organisation's main business activities	**Number of participants**	**Percentage**
ICT	4	11%
Financial / Accounting	13	28%
Manufacturing / Retail	8	17%
Education	4	9%
Transport, Travel and Tourism	6	13%
Other s	10	22%

Q1-6**:** How does your organisation record and keep track of business transaction of financial nature? (More than one can be selected)

N=46		
Means of keeping accounting transactions	**Number of participants**	**Percentage**
Automated (Commercial Accounting Package)	28	61%
Automated (Spread Sheet e.g. Excel, Word Processor e.g. Ms Word)	4	9%
Manual (Pen and Paper)	8	17%
No system of any sort	0	0%
Combination of any of the above	6	13%

Q1-7**:** If using commercial accounting package: What is the system that you use?

N=34		
Name of commercial accounting package used	**Number of participants**	**Percentage**
Pastel	20	59%
Quick Books	4	12%
Econo-accounting	2	6%
Omni	2	6%
Automate	2	6%
Pascal	2	6%
Pastel + Other	2	6%

Q1-8: Please indicate customer documents that your organisation processes

N=46		
Customer documents processed	**Number of participants**	**Percentage**
Credit Notes	28	61%
Debit Note	16	35%
Invoices	44	96%
Sales Orders	16	35%
Sales Quotation	27	59%
Time and Billing	10	22%
None	0	0%

Q1-10: What transactions does your organisation record in the cash book?

N=46		
Cash book transactions	**Number of participants**	**Percentage**
Payments	43	59%
Receipts	41	12%
Other (interests, and orders)	5	6%

Q1-12**:** Please indicate the supplier documents that your organisation processes.

N=46		
Supplier documents processed	**Number of participants**	**Percentage**
Credit Notes	21	46%
Returns Debit Note	10	22%
Supplier Invoices	39	85%
Purchase Orders	25	54%
Goods Received Note	14	30%
No response	1	2%

Q1-14**:** Which of the following accounting functions does your organisation keep track of ?

N=46		
Accounting activities recorded	**Number of participants**	**Percentage**
Accounts Payable	42	91%
Accounts Receivable	38	83%
Inventory Control	23	50%
Payroll	28	61%
Point of Sale	6	13%
Other	0	0%

Q1-16**:** Will you be willing to participate in a user interface evaluation activity?

N=46		
User interface evaluation participation	**Number of participants**	**Percentage**
Yes	8	17%
Need clarification on user interface evaluation	20	44%
No	18	39%

2.0.Participants' biographical data frequency tables

Q2-1**:** Indicate your gender.

N=46		
Gender	**Number of participants**	**Percentage**
Male	16	35%
Female	30	65%

Q2-2**:** Please indicate your age group.

N=46		
Age group	**Number of participants**	**Percentage**
18 or younger	0	0%
19 - 24 years	1	2%
25 – 29 years	9	26%
30 – 34 years	4	11%
35 – 39 years	4	9%
40 – 44 years	5	11%
45 or older	19	41%

Q2-3: What is your home language?

N=46		
Home Language	**Number of participants**	**Percentage**
English	31	67%
Xhosa	5	11%
Afrikaans	6	13%
Other (Shona, French & Chinese)	4	9%

Q2-5: Please indicate the highest level of education that you completed.

N=46		
Highest educational level completed	**Number of participants**	**Percentage**
Less than Matric (Grade 12)	1	2%
Matric (Grade 12)	11	24%
Degree/Diploma/Certificate	30	65%
Postgraduate degree	4	9%

Q2-7**:** Please select a category which describes your work profession.

N=46		
Participants' work profession	**Number of participants**	**Percentage**
Finance and Accounting	22	48%
Information Technology	5	11%
Customer relations	4	9%
Administration	7	15%
Sales and Marketing	6	13%
Research and development	2	4%

Q2-9**:** How often do you use the computer?

N=46		
Frequency of computer use	**Number of participants**	**Percentage**
Daily	38	83%
Weekly	6	13%
Monthly	2	4%
Once or twice a year	0	0%
Never	0	0%

Q2-10**:** Do you have access to computer at home?

N=46		
Access to computer at home	**Number of participants**	**Percentage**
Yes	35	76%
No	11	24%

Q2-11: Have you ever received any book-keeping or accounting training?

N=46		
Prior training on bookkeeping / accounting	**Number of participants**	**Percentage**
Yes	40	87%
No	6	13%

Q2-12: If answer to above is Yes please indicate where you received training?

N=40		
Level of accounting training	**Number of participants**	**Percentage**
College/ University	28	61%
Secondary	2	4%
Work	16	35%
Self taught	0	0%
Other	0	0%

Q 2-14: Which of the following accounting packages /software have you used for tracking accounting transactions? (More than one can be selected.

N=46		
Accounting tools used	**Number of participants**	**Percentage**
Accountmate	1	2%
AccPac	8	17%
Automate	1	2%
IQELite	2	4%
Microsoft Excel	24	52%
Pastel	37	80%
QuickBooks	12	26%
Turbo Cash	8	17%
Other (BAAN, Syspro, econo-accounting)	3	7%
None	4	9%

Q2-16**:** How often do you use such accounting packages?

N=46		
Frequency of using accounting tools.	**Number of participants**	**Percentage**
Daily	30	83%
Weekly	8	13%
Monthly	4	4%
Once or twice a year	0	0%
Never	4	9%

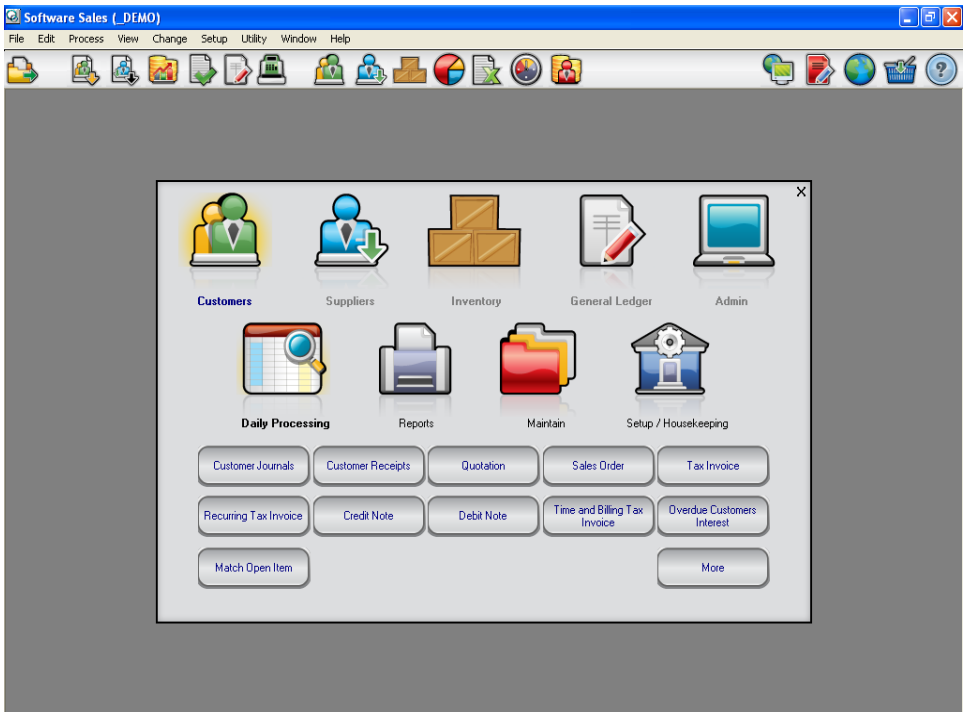
Q2-17: Please select the computer applications you have used (more than one can be selected)

N=46		
Other computer packages used	**Number of participants**	**Percentage**
Accounting packages (e.g. pastel	40	87%
Internet and E-mail	35	76%
Presentation applications (e.g. PowerPoint)	22	48%
Spreadsheets (e.g. Excel)	46	100%
Statistics packages (e.g. SPSS	18	39%
Word processors(e.g. Word)	46	100%

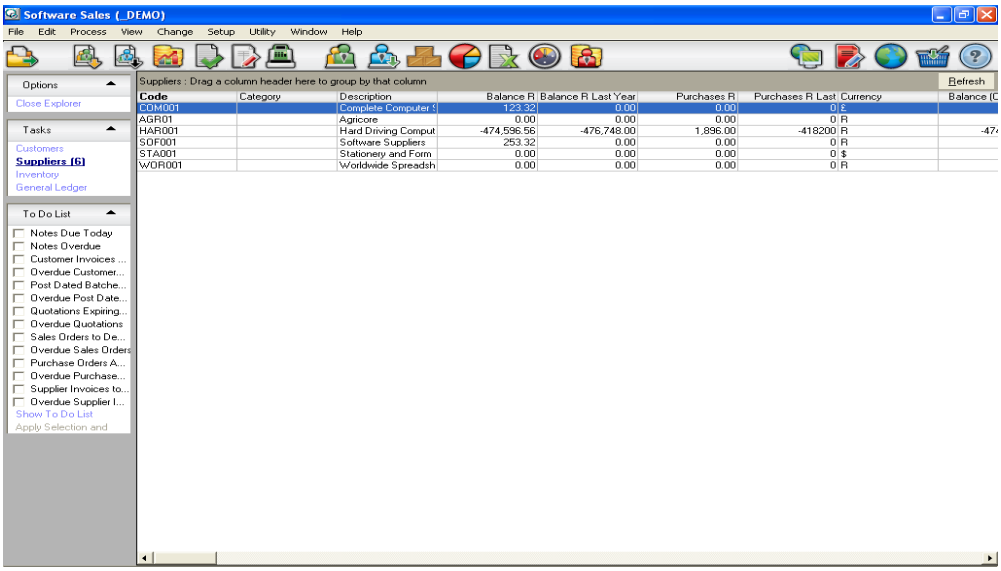
3.0. Attitude towards computer use

Attitude	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Q3-1: I find working with computers very easy	0	2	4	6	34
Q3-2: I seem to have difficulties with most applications I have tried to use	27	6	3	7	3
Q3-3: Computers scare me	41	5	0	0	0
Q3-4: I enjoy working with computers	0	3	6	8	29
Q3-5: Using computers make me more productive	0	5	7	2	32
Q3-6: I often have difficulties when trying to learn how to use a new computer package	15	13	5	10	3
Q3-7: Most of the computer packages i have used have been easy to use	0	7	3	20	16
Q3-7: Computer terminology confuses me	20	14	9	3	0
Q3-8: Sometimes when using a computer things seem to happen and i dont know why	4	3	19	20	0
Q3-9: I consider myself a skilled computer user	0	5	7	6	28
Q3-10: When using computers I fear that I might press the wrong button and damage the system	37	3	0	6	0
Q3-11: I always seem to have problems when trying to use computers	32	12	1	1	
Q3-12: I find it difficult to get computers do what i want them to do	28	6	5	7	0
Q3-13: Computers are too complicated for me	33	5	3	5	0
Q3-14: How would you rate your experience with computers ?	Intermediate	36	Beginner	36	Expert 9

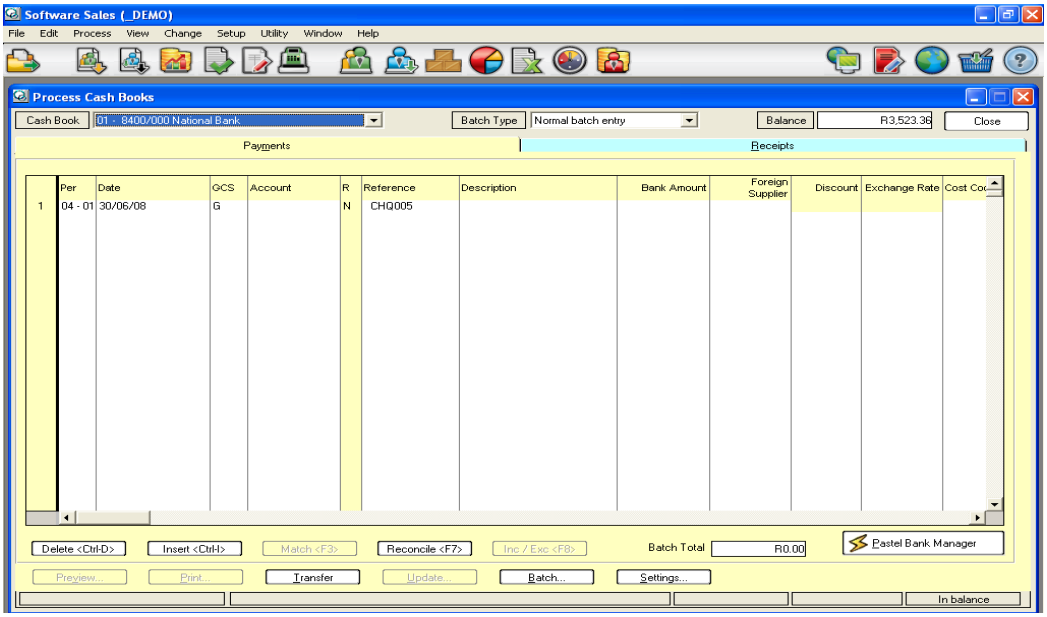
Appendix C: Pastel Xpress 2009 UI screen shots



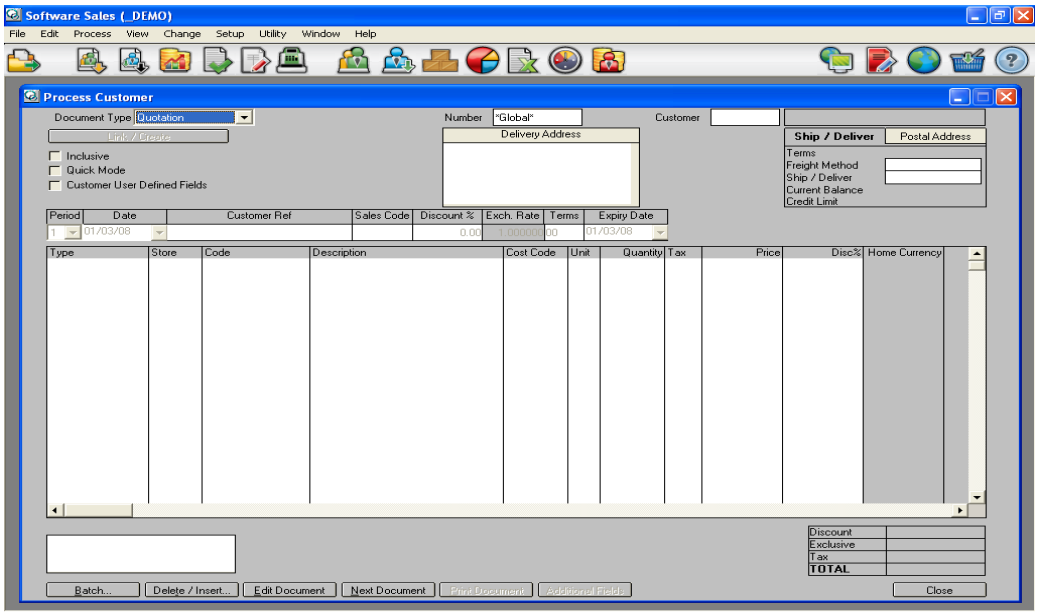
Pastel Xpress 2009 main window (navigator view)



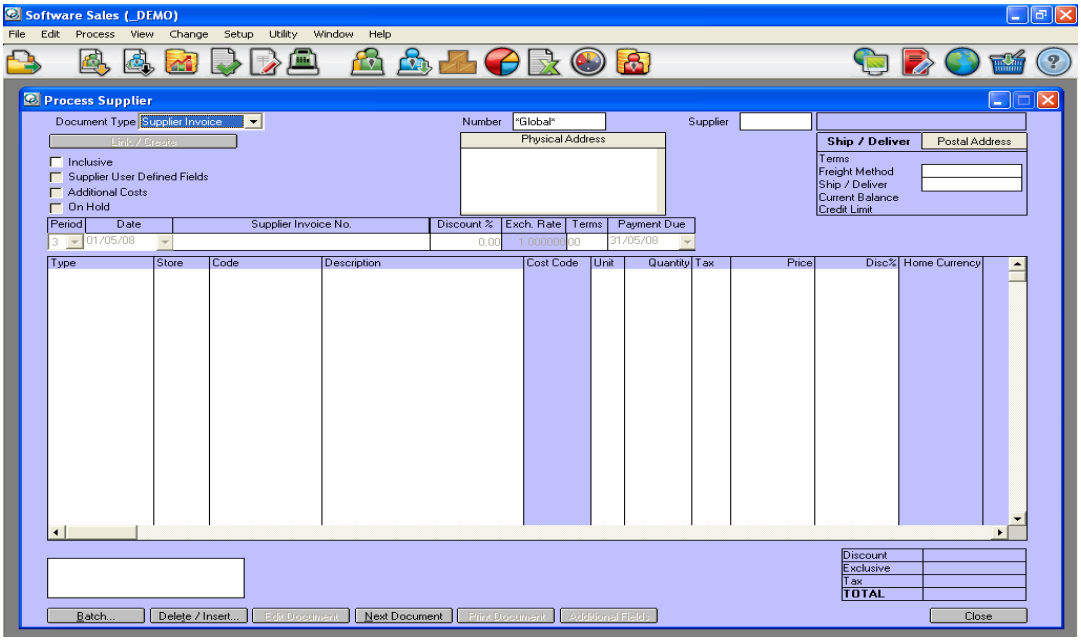
Pastel Xpress 2009 main window (explorer view)



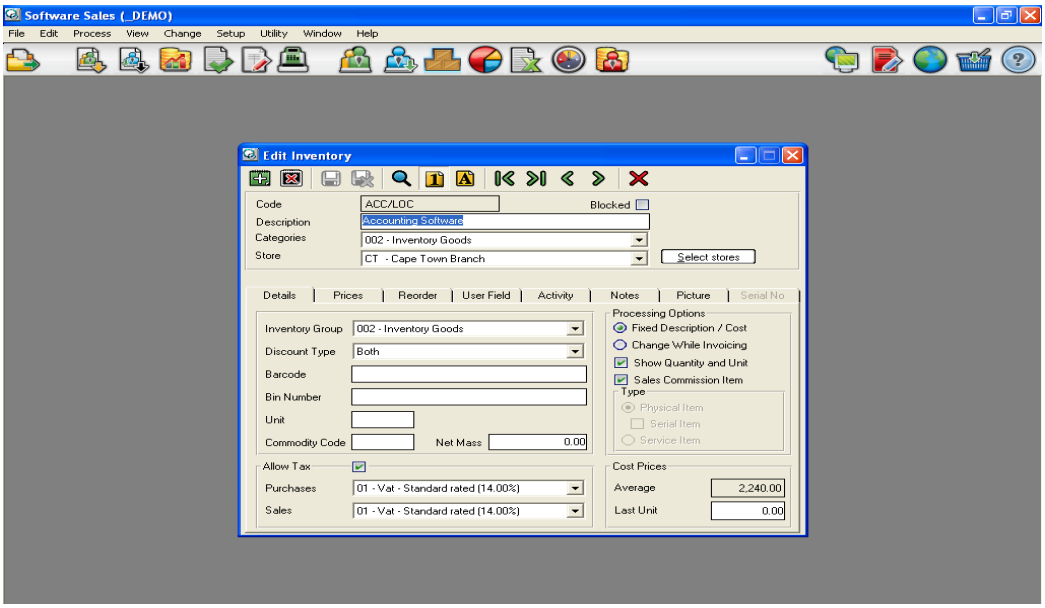
Pastel Xpress 2009: Process Cash Book



Pastel Xpress 2009 Process Customer Quotation



Pastel Partner 2009 Process Supplier Invoice



Pastel Xpress 2009 Edit Inventory

Appendix D: Participant background questionnaire

BIOGRAPHICAL INFORMATION									
Instructions: Mark your selection with an X in the relevant box									
1. Gender	Female			Male					
2. Home language	English		Xhosa		Afrikaans		Other		
3. If answer to above is other please specify:									
4. Age (Years)	Less than 20		20-30		31 - 40		41 or above		
COMPUTER LITERACY (PRIOR TO JULY 2009)									
5. For how long have you been using computers?									
Less than 1 year		1-5 Years		5-10 Years		More than 10 years			
6. What is the frequency of your computer use?									
Daily		Weekly		Monthly		Once or twice a year		Never	
7. How would you rate your level of computer experience?									
Beginner		Intermediate		Expert					
8. Which category best describes your profession									
Finance /Accounting		Administration		Technical		Student		Other	
If answer to above is other please specify:									
9. Have you ever received any accounting training?				Yes		No			
If Yes please select where you received training									
College/ University		Secondary School		Work		Other			
10. If answer to above is other please specify:									
11. Have you ever used Pastel Accounting?				Yes		No			
12. If Yes for how long have you used the application?									
Less than 1 year		1-5 Years		5-10 Years		More than 10 years			
13. Which version of Pastel accounting do you use?									

Xpress 2009		Xpress 2007		Partner 2007		Partner 2009		Evolution	
14. What is the frequency of using the application?									
Daily		Weekly		Monthly		Once or twice a year		Never	
15. How would you rate your level of Pastel experience?									
Beginner		Intermediate		Expert					
16. Have you ever used any accounting software package(s) beside Pastel?				Yes		No			
If Yes : Name of package(s):									

Appendix E: Pastel Usability Evaluation Moderator Script

Background

- My name is Job, and I am a MTech Candidate at Nelson Mandela Metropolitan University
- I'll be working with you today on this session evaluating the usability of Pastel Accounting Tool
- I will be moderating today's usability evaluation session

First let me explain why we are doing this usability evaluation exercise

The objective of this User interface (UI) usability evaluation exercise is to find out how easy it is for you to use Pastel Accounting software. Through the findings we seek to improve on the accounting application packages in terms of user friendliness, simplicity and ease of use basing on your feedback.

We want our test to be as "real" as possible; so don't be afraid to ask questions or use anything you have around that might help you complete the tasks.

Please be completely honest when expressing your thoughts. I'm just here to moderate the study, so nothing you say about Pastel will upset me or hurt my feelings. During the session if you find some part Pastel accounting to be hard or doesn't make sense, be sure to let me know. Also, if something works great or surprises you in a good way, be sure to tell me about that too. We want all of your feedback.

Introduction

- You are working on a demo version of the Pastel application tool
- The package is a fully functional miniature of the real system.
- Feel free to perform your task the transaction won't affect anything it's for evaluation only
- During this session, I'll ask you to complete some tasks and answer some questions.
- It is important that you answer questions on what you have practically experienced truthfully and not on what you think.

Procedure

- I will present to you a scenario and a few tasks to do

- I want you to read the scenario and task aloud before commencing task
- I will ask some questions before and after the tasks
- Work as if you are within your work context in your office
- While performing the tasks, please "think aloud" telling me everything you think, what is missing, what you don't understand, etc about Pastel accounting software.
- Make the best effort to complete each task. Seek help when you feel you are stuck
- If you have questions I might not be able to answer them, since am not part of the development team
- There might be need that I ask you to repeat a task: This happens when I don't have all the information I need yet.
- Sometimes I might ask you to proceed before you have completed the task. This happens when I have all the data I need
- In order for me to gather the full data I need I will ask you to move through the tasks very slowly.
- Let me know when you think you have completed a given task.

Participant rights disclaimer

- This study is completely voluntary. By listening to your thoughts and observing your actions, we hope to make using Pastel easier and more enjoyable.
- Nothing you say or do will be used to evaluate you. We are only evaluating Pastel Accounting
- No personally identifiable information gathered during this study will be shared with anyone or used for anything else outside the scope of the research.
- You are free to take a break or stop the test at any time for any reason.

Any questions?

Preparation

Launch the application main window

Hand out script and pen to the participants

Final Introduction

Mouse – Use your mouse to point out any areas of the screen you are looking at

Think Aloud

- Please think aloud, I need you to tell me everything you think, you see to be missing, what you don't understand, etc about Pastel accounting software.
- Please be completely honest when expressing your thoughts. I'm just here to moderate the study, so nothing you say about Pastel will upset me or hurt my feelings
- Any Questions?

Warm Up 10 min

- Take a moment to look at the Pastel Main window and make brief comments about it.
    - *Follow up: Comments on attractiveness, choice of colour, appropriateness of metaphors used and navigation options available*
- What are the tasks that you quickly note than can be easily performed using Pastel accounting from the main window?
    - *Follow up: Recognition of icons used in relation to intended task and menu*

Observations and Comments

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Scenario 1: User Management and Access Rights 10min

You are the Administrator of Pastel accounting in your organisation and you have the responsibility of adding new users to the system as well as setting access rights for them within the Pastel accounting application tool.

Your organisation has recruited new staff that needs to be added to the system setting with the proper access rights for them.

The following are the list of users to be added and access rights set for them.

- John Ricky – John Ricky is a operations manager with **view only** access
- Mike Dunlop—Mike is a creditor's clerk with the responsibility of **processing supplier documents** and **editing and updating** supplie**r** details.
- Jimmy Zee – Jimmy is a **supervisor** in the system

? Ask if the participant has well understood the scenario and validate its applicability to the participants organisation

Suggested path

From main window menu bar select **Setup** >> **Users/ User Passwords** >> **Users**

(Fill in the relevant user details and set the respective access rights)

Focus questions

? Ask the participant why she / he chooses the menu item or icons she/he opts for.

? Ask to comment on all the data labels, commands and options on **Setup Users / Password – Sole Access Mode** form. Let us know if the dialog box components are intuitive to, if they make sense to you, satisfy you easy to remember and easy to use.

? Ask: What sections of the form did you find to be difficult to complete, difficult to understand and those you find impressive to work with?

? Ask: What else do you expect to see on this screen for you to effectively and efficiently complete the task.

Observation Comments

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Scenario 2: Inventory Management 5min

Creating inventory item

Your organisation has expanded and introduced a new inventory item called Philabao decoders. Allow both discount types and a standard 14% VAT rate on the item. Set the following exclusive prices

- Cash R300-00
- Dealer R250-00
- Pharm R230-00

You are to create the inventory item using the following information:

Code	PHB002
Name	Philabao decoders
Categories	Medical Appliances
Inventory Group	Inventory Goods
Cost price	R200, 00
Suppliers	Health Appliances
Reorder Levels	Min 5, Max 50

? Ask if the participant has well understood the scenario and validate its applicability to the participants organisation

Suggested path

- From main window menu bar select **Edit** >> **Inventory** >> **Item File** >> click the **New** command

  OR

- Select the **Edit Inventory** Icon from the Icon Bar >> click the **New** command

  (Fill in the relevant inventory details)

Focus questions

? Ask the participant why she / he chooses the menu item or icons she/he opts for.

? Ask to comment on all the data labels, commands and options on **Edit Inventory Item** dialog box. Let us know if the dialog box components are intuitive to, if they make sense to you, satisfy you easy to remember and easy to use.

? Ask: What sections of the form did you find to be difficult to complete, difficult to understand and those you find impressive to work with?

? Ask: What else do you expect to see on this screen for you to effectively and efficiently complete the task?

Observation Comments

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Scenario 3: Processing supplier documents 5min

Process Supplier Purchase Order

> Your inventory stock is running low on the following items Philabao decoders
>
> Create a **Purchase Order** for
>
> - **30 units** of Philabao decoders to be purchased from Health Appliances

? Ask if the participant has well understood the scenario and validate its applicability to the participants organisation

Suggested path

- Select the **Supplier documents** icon from the tools bar >>Click on **Purchase Order**

OR

- From main window menu bar select **Process** >> **Supplier** >> select **Purchase Order** from the Document Type drop down list

(Select the right supplier and fill in the relevant order details click on Next Document to create another Purchase Order)

Focus questions

- Ask the participant why she / he chooses the menu item or icons she/he opts for.

- Ask: The participants to comment on all the data labels, commands and options on **Process Supplier Purchase Order** form. Let us know if the form components are intuitive, attractive, pleasing to work with, if they make sense to you, satisfy you, easy for you to remember them and easy to use.

- Ask: What sections of the form did you find to be difficult to complete, difficult to understand and those you find impressive to work with?

- Ask: How easy is it to **browse for a supplier and find** the specific supplier details?

- Ask: How easy is it to add / edit Purchase Order **line items**?

- Ask: What else do you expect to see on this screen for you to effectively and efficiently complete the task?

Observation Comments

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Process supplier invoice

Health Appliances have sent an invoice for the goods supplied. You are to process a **supplier invoice** for the supplier linking it to the purchase order. Invoice Number for Health Appliances is 789862

? Ask if the participant has well understood the scenario and validate its applicability to the participants organisation

Suggested path

- Select the **Supplier documents** icon from the tools bar >>Click on **Supplier Invoice**

OR

- From main window menu bar select **Process** >> **Supplier** >> select **Supplier invoice** from the Document Type drop down list

(Select the right supplier and fill in the relevant order details to complete the Invoice)

Focus questions

? Ask the participant why she / he chooses the menu item or icons she/he opts for.

? Ask: The participants to comment on all the data labels, commands and options on **Process Supplier invoice** form. Let us know if the form components are intuitive, attractive, pleasing to work with, if they make sense to you, satisfy you, easy for you to remember them and easy to use.

? Ask: What sections of the form did you find to be difficult to complete, difficult to understand and those you find impressive to work with?

? Ask: How easy is it to **browse for a supplier and find** the specific supplier details?

? Ask: How easy was it to **link** the Invoice to the Purchase order

? Ask: How easy is it to add / edit Invoice **line items**?

? Ask: What else do you expect to see on this screen for you to effectively and efficiently complete the task?

Observation Comments

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Scenario 4: Customer documents processing 5min

Create Customer Account

Mill Mattie is new ***End User Account*** customer. You are to add her to the customer list using the details given below.

Code	MMA001
Name	Mill Mattie Trading
Category	End User
Postal Address	P O Box 12
Postal Address	Summerstrand 6001
Delivery Address 1	53 Ivana Avenue
Delivery Address 2	22 Cork Road
Account Contact Name	Mill
Tel No	27 41 504 3302
Fax No	27 41 504 3300
Cell No	27 79 305 6114
Email	mill@demo.org
Rep	Tracey Lynn

? Ask if the participant has well understood the scenario and validate its applicability to the participants organisation

Suggested path

- From main window menu bar select **Edit** >> **Customers** >> **Accounts>>** click on the **New** icon

OR

- Select the **Customer documents** icon from the tools bar >>Click on **Quotation** >> click **Customer zoom icon** >> click on the **New** icon

(*Fill in the relevant customer details*)

Focus questions

? Ask the participant why she / he chooses the menu item or icons she/he opts for.

? Ask: The participants to comment on all the data labels, commands and options on **Edit Customer Accounts** dialog box. Let us know if the dialog box components are intuitive to, if they make sense to you, satisfy you, easy for you to remember them and easy to use.

? Ask: What sections of the dialog box did you find to be difficult to complete, difficult to understand and those you find impressive to work with?

? Ask: What else do you expect to see on this screen for you to effectively and efficiently complete the task?

Observation Comments

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Scenario 5: Cashbook Processing Cash Book Processing

During the course of the day the following financial transactions transpired.

- On 07/09/09 You received a payment amounting to R5000-00 from Mill Mattie.
- On 08/09/09 You paid salaries and wages amount to R2000-00
- 0n 09/09/09 A bad debt amounting to R1000-00 has been recovered
- 0n 09/09/09 You donated R1500-00 to an orphanage

You are required to record these transactions in the Current Account cash book

? Ask if the participant has well understood the scenario and validate its applicability to the participants organisation

Suggested path

- From main window menu bar select **Process** >> **Cash Book** >> select **Correct bank,** normal batch entry, payment / receipts, enter the line items

OR

- Cilck on **Cash Book** icon from the tool bar>> select **correct bank** , normal batch entry, payments / receipts, enter line items

Focus questions

? Ask the participant why she / he chooses the menu item or icons she/he opts for.

? Ask: The participants to comment on all the data labels, commands and options on **Process Cash Book form.** Let us know if the form components are easy to understand, attractive, pleasing to work with, if they make sense to you, satisfy you, easy for you to remember them and easy to use.

? Ask: What sections of the form did you find to be difficult to complete, difficult to understand and those you find impressive to work with?

? Ask: How easy is it to **complete the cash book processing task** and complete the transfer process?

? Ask: How easy is it to add / edit Inventory Journal transfer **line items**?

? Ask: What else do you expect to see on this screen for you to effectively and efficiently complete the task?

Observation Comments

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Appendix F: Pastel Usability Task List

Warm Up

- Take a moment to look at the Pastel Main window and make brief comments about it.
  - *Follow up: Comments on attractiveness, choice of colour, appropriateness of metaphors used and navigation options available*
- What are the tasks that you quickly note than can be easily performed using Pastel accounting from the main window?
  - *Follow up: Recognition of icons used in relation to intended task and menu*

Scenario 1: User Management and Access Rights

You are the Administrator of Pastel accounting in your organisation and you have the responsibility of adding new users to the system as well as setting access rights for them within the Pastel accounting application tool.

Your organisation has recruited new staff that needs to be added to the system setting with the proper access rights for them.

The following are the list of users to be added and access rights set for them.

- John Ricky – John Ricky is a operations manager with **view only** access
- Mike Dunlop—Mike is a creditor's clerk with the responsibility of **processing supplier documents** and **editing and updating** supplier details.
- Jimmy Zee – Jimmy is a **supervisor** in the system

Scenario 2: Inventory Management Creating inventory item

Your organisation has expanded and introduced a new inventory item called Philabao decoders. Initially the product is only to be available to the Cape Town store. Allow both discount types and a standard 14% VAT rate on the item. Set the following exclusive prices

- Cash R300-00
- Dealer R250-00
- Pharm R230-00

You are to create the inventory item using the following information:

Code	PHB002
Name	Philabao decoders
Categories	Medical Appliances
Inventory Group	Inventory Goods
Cost price	R200, 00
Suppliers	Health Appliances
Reorder Levels	Min 5, Max 50

Scenario 3: Supplier documents processing Preparing Customer Sales Order

Your inventory stock is running low on the following items Philabao decoders

Create a **Purchase Order** for

- **30 units** of Philabao decoders to be purchased from Health Appliances

Process Supplier Invoice

Health Appliances have sent an invoice for the goods supplied. You are to process a **supplier invoice** for the supplier linking it to the order. Invoice Number for Software Supplier is 789862

Scenario 3: Customer documents processing Create Customer Account

Mill Mattie is new ***End User Account*** customer. You are to add her to the customer list using the details given below.

Code	MMA003
Name	Mill Mattie Trading
Category	End User
Postal Address	P O Box 12
Postal Address	Summerstrand 6001
Delivery Address 1	53 Ivana Avenue
Delivery Address 2	22 Cork Road
Account Contact Name	Mill
Tel No	27 41 504 3302
Fax No	27 41 504 3300
Cell No	27 79 305 6114
Email	mill@demo.org
Rep	Tracey Lynn
Processing Method	Balance Forward
Documents	Print & Email
Statements	Print & Email
Terms	Monthly 30 days Normal
	5% within 14 days of
Price List	Retail
Credit Limit	R10, 000-00

Scenario 5: Cashbook Processing *Cash Book Processing*

During the course of the day the following financial transactions transpired.

- On 07/09/09 You received a payment amounting to R5000-00 from Mill Mattie.
- On 08/09/09 You paid salaries and wages amount to R2000-00
- 0n 09/09/09 A bad debt amounting to R1000-00 has been recovered
- 0n 09/09/09 You donated R1500-00 to an orphanage

You are required to record these transactions in the Current Account cash book

Appendix G: Post Test Questionnaire

Please rate the strength of your agreement on the statements below concerning how you find your experience interacting with Pastel Accounting software. The rating ranks form Strongly Agree (1) to Strongly Disagree (5).

User interface attribute	Rating				
1. Subjective Satisfaction	**Strongly Agree (1)**				**Strongly Disagree (5)**
a) Overall, I am satisfied with the ease of completing this task	☐	☐	☐	☐	☐
b) Pastel Accounting system is complicated making it not pleasing to use	☐	☐	☐	☐	☐
2. Consistence					
a) Pastel Accounting design is confusing making it difficult to do my work	☐	☐	☐	☐	☐
b) I find same function keys to be consistent throughout the system performing similar function	☐	☐	☐	☐	☐
3. Attractiveness					
a) Pastel Accounting user interface is simple and clean	☐	☐	☐	☐	☐
b) Overall, am pleased with the choice of colours used throughout the application	☐	☐	☐	☐	☐
4. Familiarity					
a) This system felt familiar due to my prior knowledge of other computer based systems.	☐	☐	☐	☐	☐
b) My background on accounting helped me use Pastel accounting easily	☐	☐	☐	☐	☐
5. Tolerance					
a) On errors Pastel accounting error messages indicate the action i need to take to correct the error	☐	☐	☐	☐	☐
b) The system always gave me messages warning	☐	☐	☐	☐	☐

	me of possible errors possible					
6.	**System terminology**					
a)	**The terms used in Pastel accounting commands and objects are common in the accounting field**	☐	☐	☐	☐	☐
b)	**I fail to understand some of the terms used in Pastel accounting menus and objects**	☐	☐	☐	☐	☐
7.	**Predictability**					
a)	**While performing the tasks I would get results that I predicted and expected**	☐	☐	☐	☐	☐
b)	**Sometimes when using a Pastel accounting things seem to happen and I don't know why**	☐	☐	☐	☐	☐
8.	**Feedback**					
a)	**At times the system leaves me wondering whether I have successfully completed the task or not**	☐	☐	☐	☐	☐
b)	**Whenever there is an observable delay in the systems response, the system keeps me informed of the processing progress**	☐	☐	☐	☐	☐
9.	**Help**					
a)	**When stuck I could easily refer to the Pastel accounting help and find my way out**	☐	☐	☐	☐	☐
10.	**Control and freedom**					
a)	**Moving between different screens and pages in Pastel accounting was easy for me**	☐	☐	☐	☐	☐
b)	**At times I failed to make the system do exactly what I wanted it to do**	☐	☐	☐	☐	☐
c)	**At times I did not know where to go next to complete a given task**	☐	☐	☐	☐	☐

Appendix H: Expert review checklist

The purpose of this expert appendix is to present the expert review checklist designed for evaluating Pastel accounting UX and presenting the results from the experts.

The purpose of this expert review is to examine the Pastel accounting's user interface factors impacting on the user's experience as a result of their interaction with the accounting tool basing on the given metrics. Please answer each and every question to the best of your ability. Your input and time spent on answering this expert review is considered very valuable and is highly appreciated. Should you have any questions, you may contact me at Job.Mashapa@nmmu.ac.za or the study leader, Ms Darelle van Greunen at Darelle.vanGreunen@nmmu.ac.za.

The following options may be used to answer the questions on the subsections:

Yes: if you agree with the statement/question in relation to the Pastel Xpress accounting user interface

No: If you disagree with the statement/question in relation to the Pastel Xpress accounting user interface

N/A: If you believe that the statement/question is not applicable to the Pastel Xpress accounting user interface

The following five point scale rating from 0 to 4 is to be used to evaluate the severity of the Pastel accounting tool's divergence form good user interface design principles. In the rating section please rate the severity of the impact on the tool's usability.

0: I do not agree there is a usability problem at all

1: Cosmetic problem only- need not to be fixed unless extra time is available

2: Minor usability problem- fixing this should be given low priority

3: Major usability problem – important to fix should be given high priority

4: Usability catastrophe- imperative to fix this immediately

Comments: The comments section is available to enter any comments relating to the specific statement/question and how it relates to the Pastel accounting user interface. It may also be used to make suggestions for improvement.

EXPERT BIOGRAPHICAL INFROMATION
Name & Surname
Home language
Gender
Email Address
Pastel Version
Pastel Experience (Expert, Intermediate or Beginner)
Usability / UI design Experience (Expert, Intermediate or Beginner)

Usability Heuristic	Yes / No / NA	Rating	Comment
1. **Attractiveness**			
Is the Pastel Xpress accounting user interface structure simple and clean?			
Do colour choices make it easy for readability?			
Is the assignment of colour codes conventional from screen to screen?			
Is there good balance between low saturated colours and intense saturated colours between images and background?			
Is the Pastel Xpress accounting user interface aesthetically pleasing?			
Have large objects, bold lines, and simple areas been used to distinguish icons?			
Does the visual layout of objects used show a symmetric match?			
Does each icon stand out from its background?			
Are meaningful groups of items separated by white space?			
2. **Help**			
Does the system have an online Help function?			
Is the help function visible? For example, a key labelled HELP or a special menu?			
Is the help information goal-oriented (what can I do with this program)?			
Is the help information descriptive (what is this UI component for)?			
Is the help information procedural (how do I do this task)?			
Is the help information interpretive (why did that happen)?			
Does the helpline provide navigational information (where am I)?			
Is the helpline context-sensitive?			
Can users easily switch between help and their work?			
3. **Error Tolerance**			
Does the system warn users if they are about to make an error?			
Are potential errors recognized before becoming a problem e.g. by asking for action confirmation?			
On error does Pastel accounting tell the user the action needed to recover from the error?			
Is sound used to signal an error?			
Are error messages clear and in plain language (avoiding codes)?			
Do error messages provide a clear exit point?			
Usability Heuristic	**Yes / No / N/A**	**Rating**	**Comment**
If an error is detected in a data entry field, does the system place the cursor in that field or highlight that error?			
4. **Familiarity**			
Do the UI icons match with the user's mental model in the real world?			
Is the Pastel Xpress accounting UI components			

familiar to what the user uses often, e.g. MS Windows?	
Is Pastel accounting familiar UI familiar to the accounting field?	
Does the UI design of Pastel Xpress accounting make it easy to recognize possible system tasks?	
Is the menu-naming terminology consistent with the user's task domain?	
5. **Consistence**	
Is the assignment of colour codes conventional?	
Does the keyboard short cuts used conform to the standard traditional short cuts used to perform common functions?	
Are similar commands presented in similar ways across all task windows?	
Is the labels location consistent in similar windows and dialog boxes?	
Is there consistency in the commands used to perform similar specific functions?	
Is there consistency in font size in all windows?	
Is there consistency in font colour in all windows?	
Is there consistency in font type in all windows?	
Are the common commands used consistent with the general computer terms (e.g. SAVE, OK and close)?	
6. **Feedback (Visibility of system status)**	
Is there some form of system feedback for every operator action (e.g. record saved successfully)?	
Are there observable delays in the system's response time and is the user kept informed of the system's progress?	
Is there visual feedback in menus or dialogue boxes about which choices are selectable?	
Does the system provide *visibility:* that is, by looking, can the user tell the state of the system and the alternatives for action?	
7. **User Control and freedom**	
Can users cancel out operations in progress?	
Is it always easy to return to the main window?	
Is it easy to navigate to all major tasks from the main window?	
When multiple windows are opened, is it easy for users to switch between windows?	
Can users customise the UI to match their liking (e.g. changing colour, font size etc)?	.
Do users have options to perform a similar task (e.g. via a menu, keyboard or icons)?	
8. **System Terminology**	
Are the terms used in Pastel Xpress accounting tool common in the accounting field?	
Does the Pastel UI language employ accounting related jargon and avoid computer	

jargon?	
Does the system automatically enter the correct currency sign for monetary entries?	
Does the system automatically enter the decimals for monetary entries?	
Is the vocabulary appropriate for the intended audience?	
9. **Predictability**	
Are Pastel Xpress accounting terms clear and easily understood?	
Are the UI components always unambiguous and clear to interpret?	

Appendix I: Expert review results

This appendix presents the results from the expert reviews that were participated in the UX evaluation activity.

Expert reviewer 1

The purpose of this expert appendix is to present the expert review checklist designed for evaluating Pastel accounting UX and presenting the results from the experts.

The purpose of this expert review is to examine the Pastel accounting's user interface factors impacting on the user's experience as a result of their interaction with the accounting tool basing on the given metrics. Please answer each and every question to the best of your ability. Your input and time spent on answering this expert review is considered very valuable and is highly appreciated. Should you have any questions, you may contact me at Job.Mashapa@nmmu.ac.za or the study leader, Ms Darelle van Greunen at Darelle.vanGreunen@nmmu.ac.za.

The following options may be used to answer the questions on the subsections:

Yes: if you agree with the statement/question in relation to the Pastel Xpress accounting user interface

No: If you disagree with the statement/question in relation to the Pastel Xpress accounting user interface

N/A: If you believe that the statement/question is not applicable to the Pastel Xpress accounting user interface

The following five point scale rating from 0 to 4 is to be used to evaluate the severity of the Pastel accounting tool's divergence form good user interface design principles. In the rating section please rate the severity of the impact on the tool's usability.

0: I do not agree there is a usability problem at all

1: Cosmetic problem only- need not to be fixed unless extra time is available

2: Minor usability problem- fixing this should be given low priority

3: Major usability problem – important to fix should be given high priority

4: Usability catastrophe- imperative to fix this immediately

Comments: The comments section is available to enter any comments relating to the specific statement/question and how it relates to the Pastel accounting user interface. It may also be used to make suggestions for improvement.

EXPERT BIOGRAPHICAL INFROMATION

Name & Surname	Alexandros Yeratziotis
Home language	English
Gender	Male
Email Address	alexis.yeratziotis@gmail.com
Pastel Experience (Expert, Intermediate or Beginner)	Beginner
Usability / UI design Experience (Expert, Intermediate or Beginner)	Intermediate

Usability Heuristic	Yes	/ No / NA	Rating	Comment
1. **Attractiveness**				
Is the Pastel Xpress accounting user interface structure simple and clean?	x		0	At a first glance it seems like a clean GUI. It would probably make more sense for an experienced user to understand the icons/labels available.
Do colour choices make it easy for readability?	x		1	Colours do assist readability. However, too many colours are being used, which can cause confusion at times.
Is the assignment of colour codes conventional from screen to screen?		x	1	Not always conventional. However, in certain cases it seems like it makes more sense to use different colours (e.g. different colour for tax invoice, purchase order etc...)
Is there good balance between low saturated colours and intense saturated colours between images and background?	x		0	
Is the Pastel Xpress accounting user interface aesthetically pleasing?		x	3	It is a dull GUI. It does require some elements to improve the aesthetics.
Have large objects, bold lines, and simple areas been used to distinguish icons?	x		0	

Does the visual layout of objects used show a symmetric match?	x		0	
Does each icon stand out from its background?	x		0	
Are meaningful groups of items separated by white space?	x		2	When using "system navigator", the available options that correspond to each icon need to be made clearer.
2. **Help**				
Does the system have an online Help function?		x	3	The system has a connection to their web site but there is no clear indication of online help
Is the help function visible? For example, a key labelled HELP or a special menu?	x		1	There is help icon but it uses a question mark, which could cause confusion.
Is the help information goal-oriented (what can I do with this program)?	x		0	
Is the help information descriptive (what is this UI component for)?	x		0	
Is the help information procedural (how do I do this task)?	x		0	
Is the help information interpretive (why did that happen)?	x		0	
Does the helpline provide navigational information (where am I)?		x	3	There are some navigation points but it's not clear enough. I think it is necessary to add navigational queues because there is a wealth of help information that the user will have to search through.
Is the helpline context-sensitive?			x	
Can users easily switch between help and their work?	x		2	Even though this is possible, the task window or help window will minimize on to the task bar, depending on which of the two, the user is using. It would be more useful if it were possible to have both opened alongside each other without the one window blocking information on the other one.
3. **Error Tolerance**				
Does the system warn users if they are about to make an error?			x	
Are potential errors recognized before becoming a problem e.g. by asking for action confirmation?		x	2	I tried various tasks. Some did require confirmation. However, the consequences of my actions were not always explained to me.
On error does Pastel accounting tell the user the action needed to recover from the error?		x	3	
Is sound used to signal an error?			x	Did not have sound to test.
Are error messages clear and in plain language (avoiding codes)?	x		0	I did not notice any codes in my error messages. But to understand the extend of my error requires domain knowledge in some cases.
Do error messages provide a clear exit point?	x		0	
Usability Heuristic	**Yes / No / N/A**		**Rating**	**Comment**
If an error is detected in a data entry			x	

field, does the system place the cursor in that field or highlight that error?				
4. **Familiarity**				
Do the UI icons match with the user's mental model in the real world?	x		0	Icons are understandable. They should make even more sense to users who have accounting knowledge.
Is the Pastel Xpress accounting UI components familiar to what the user uses often, e.g. MS Windows?	x		2	There are similarities (e.g. menu on top and icons under the menu bar). I would suggest making more use of other MS components (e.g. undo function).
Is Pastel accounting familiar UI familiar to the accounting field?		x		
Does the UI design of Pastel Xpress accounting make it easy to recognize possible system tasks?	x		2	I found it simple to locate the different tasks. I did find inconsistency using the menu in comparison to the system navigator.
Is the menu-naming terminology consistent with the user's task domain?	x		0	This is not my domain, yet I was able to understand many of the available tasks and options. This is just form the menu and icons. I did not try and complete any tasks. This was beyond my knowledge.
5. **Consistence**				
Is the assignment of colour codes conventional?	x		0	The background colour of the menus and windows are compatible with the MS styles.
Does the keyboard short cuts used conform to the standard traditional short cuts used to perform common functions?	x		3	F1 for Help and F10 gives access to the menu. These are compatible with MS styles. The only other short cuts that could be used are F2 and F4. They require domain knowledge. I think the use of more functional keys would be useful.
Are similar commands presented in similar ways across all task windows?	x		0	e.g. All accounts are similar in functionality and presentation
Is the labels location consistent in similar windows and dialog boxes?	x		0	e.g. Edit customer/supplier accounts are consistent
Is there consistency in the commands used to perform similar specific functions?		x		
Is there consistency in font size in all windows?	x		0	Font size seems consistent in menus, tasks and windows.
Is there consistency in font colour in all windows?		x	2	Two font colours are being used. The predominant font colour is black. However, blue font is also used in some cases.
Is there consistency in font type in all windows?	x		0	Font type seems consistent in menus, tasks and windows.
Are the common commands used consistent with the general computer terms (e.g. SAVE, OK and close)?		x	3	I was not able to find the command "save" when working with notes and receipts, etc. It uses "batch" instead. However "save" was available when working with customers and suppliers. Also "exit" and "close" are used interchangeably. These issues will

				need to be attended to as they create user confusion and uncertainty.
6. **Feedback (Visibility of system status)**				
Is there some form of system feedback for every operator action (e.g. record saved successfully)?		x	4	Feedback is vital. I did not receive any when I created a new customer or delete an existing customer.
Are there observable delays in the system's response time and is the user kept informed of the system's progress?		x	3	Even though there were no observable delays, the user is not kept informed on system progress during an action.
Is there visual feedback in menus or dialogue boxes about which choices are selectable?	x		0	This is quite clear
Does the system provide *visibility:* that is, by looking, can the user tell the state of the system and the alternatives for action?		x	3	As a beginner user, I could not determine the state of the system. I had to explore the system first before attempting any tasks.
7. **User Control and freedom**				
Can users cancel out operations in progress?		x	3	Because system feedback and progress is not available, users cannot cancel operations.
Is it always easy to return to the main window?	x		2	The system always seems to return the user back to the main window when completing a task. In some cases this may not be the preferred option of the user.
Is it easy to navigate to all major tasks from the main window?	x		0	You can use the menu or icons or system navigator.
When multiple windows are opened, is it easy for users to switch between windows?		x	3	The windows are accessible, yet they are placed on top of each other. There is no easy order to them (e.g. having them adjusted in a manner where they can all clearly be seen at the same time).
Can users customise the UI to match their liking (e.g. changing colour, font size etc)?		x	3	No customization options available.
Do users have options to perform a similar task (e.g. via a menu, keyboard or icons)?	x		0	You can use the menu or icons or system navigator.
8. **System Terminology**				
Are the terms used in Pastel Xpress accounting tool common in the accounting field?	x		0	Without being an expert in the field the terminologies sound common to the field
Does the Pastel UI language employ accounting related jargon and avoid computer jargon?	x		3	It uses accounting jargon. A user with no accounting knowledge will find it very difficult to use the system. Not much use of computer jargon though. Only the very common commands (e.g. exit, close, save).
Does the system automatically enter the correct currency sign for monetary entries?	x		0	The system was using ZAR. However, I had no idea where I could change the currency, If required.

Does the system automatically enter the decimals for monetary entries?	x	0	
Is the vocabulary appropriate for the intended audience?	x	0	The vocabulary for the intended audience seems appropriate. Yet, not suitable for other users without the knowledge. This will prevent such users from trying to learn and use the system on their own.
9. **Predictability**			
Are Pastel Xpress accounting terms clear and easily understood?	x	0	The most basic terms were clear to me. Other terms required field knowledge.
Are the UI components always unambiguous and clear to interpret?	x	2	Most components were clear. However, some were ambiguous. Once again, I would relate this to my limited background knowledge of the domain.

Expert reviewer 2

The purpose of this expert appendix is to present the expert review checklist designed for evaluating Pastel accounting UX and presenting the results from the experts.

The purpose of this expert review is to examine the Pastel accounting's user interface factors impacting on the user's experience as a result of their interaction with the accounting tool basing on the given metrics. Please answer each and every question to the best of your ability. Your input and time spent on answering this expert review is considered very valuable and is highly appreciated. Should you have any questions, you may contact me at Job.Mashapa@nmmu.ac.za or the study leader, Ms Darelle van Greunen at Darelle.vanGreunen@nmmu.ac.za.

The following options may be used to answer the questions on the subsections:

Yes: if you agree with the statement/question in relation to the Pastel Xpress accounting user interface

No: If you disagree with the statement/question in relation to the Pastel Xpress accounting user interface

N/A: If you believe that the statement/question is not applicable to the Pastel Xpress accounting user interface

The following five point scale rating from 0 to 4 is to be used to evaluate the severity of the Pastel accounting tool's divergence form good user interface design principles. In the rating section please rate the severity of the impact on the tool's usability.

0: I do not agree there is a usability problem at all

1: Cosmetic problem only need not to be fixed unless extra time is available

2: Minor usability problem- fixing this should be given low priority

3: Major usability problem – important to fix should be given high priority

4: Usability catastrophe- imperative to fix this immediately

Comments: The comments section is available to enter any comments relating to the specific statement/question and how it relates to the Pastel accounting user interface. It may also be used to make suggestions for improvement.

EXPERT BIOGRAPHICAL INFROMATION	
Name & Surname	**Brenda Scholtz**
Home language	**English**
Gender	**Female**
Email Address	**Brenda.scholtz@nmmu.ac.za**
Pastel Version	**Partner 2009**
Pastel Experience (Expert, Intermediate or Beginner)	**Expert**
Usability / UI design Experience (Expert, Intermediate or beginner)	**Expert**

Usability Heuristic	Yes / No / NA	Rating	Comment
1. **Attractiveness**			
Is the Pastel Xpress accounting user interface structure simple and clean?	x		
Do colour choices make it easy for readability?	x		
Is the assignment of colour codes conventional from screen to screen?	x		
Is there good balance between low saturated colours and intense saturated colours between images and background?	x		

Is the Pastel Xpress accounting user interface aesthetically pleasing?	x			
Have large objects, bold lines, and simple areas been used to distinguish icons?	x			
Does the visual layout of objects used show a symmetric match?	x			
Does each icon stand out from its background?	x			
Are meaningful groups of items separated by white space?	x			
2. **Help**				
Does the system have an online Help function?	x			
Is the help function visible? For example, a key labelled HELP or a special menu?	x			
Is the help information goal-oriented (what can I do with this program)?	x			
Is the help information descriptive (what is this UI component for)?	x			
Is the help information procedural (how do I do this task)?	x			
Is the help information interpretive (why did that happen)?	x			
Does the helpline provide navigational information (where am I)?		x		
Is the helpline context-sensitive?	x			
Can users easily switch between help and their work?	x			
3. **Error Tolerance**				
Does the system warn users if they are about to make an error?		x	3	Warnings are given except for with GRNs and dates. Pastel changes the dates & then if you don't check when converting to invoice you get an incorrect date.
Are potential errors recognized before becoming a problem e.g. by asking for action confirmation?		x		Same as above
On error does Pastel accounting tell the user the action needed to recover from the error?	x			
Is sound used to signal an error?	x			
Are error messages clear and in plain language (avoiding codes)?	x			
Do error messages provide a clear exit point?	x			
Usability Heuristic	**Yes / No / N/A**		**Rating**	**Comment**
If an error is detected in a data entry field, does the system place the cursor in that field or highlight that error?	x			
4. Familiarity				
Do the UI icons match with the user's mental model in the real world?	x			
Is the Pastel Xpress accounting UI components familiar to what the user uses often, e.g. MS Windows?	x			
Is Pastel accounting familiar UI familiar to the accounting field?	x			
Does the UI design of Pastel Xpress accounting make it easy to recognize	x			

possible system tasks?				
Is the menu-naming terminology consistent with the user's task domain?	x			
5. **Consistence**				
Is the assignment of colour codes conventional?	x			
Does the keyboard short cuts used conform to the standard traditional short cuts used to perform common functions?	x			
Are similar commands presented in similar ways across all task windows?	x			
Is the labels location consistent in similar windows and dialog boxes?	x			
Is there consistency in the commands used to perform similar specific functions?	x			
Is there consistency in font size in all windows?	x			
Is there consistency in font colour in all windows?	x			
Is there consistency in font type in all windows?	x			
Are the common commands used consistent with the general computer terms (e.g. SAVE, OK and close)?	x			
6. **Feedback (Visibility of system status)**				
Is there some form of system feedback for every operator action (e.g. record saved successfully)?		x	2	Biggest problem is adding of items eg Customer or Supplier. Once you click save there is no confirmation message, or no way to see that the item has been saved.
Are there observable delays in the system's response time and is the user kept informed of the system's progress?		x	2	
Is there visual feedback in menus or dialogue boxes about which choices are selectable?	x			
Does the system provide *visibility:* that is, by looking, can the user tell the state of the system and the alternatives for action?		x	2	The user can't see that the item has been added. Needs to go into another screen to do this. It is not always clear which mode you are in.
7. **User Control and freedom**				
Can users cancel out operations in progress?	x			
Is it always easy to return to the main window?	x			
Is it easy to navigate to all major tasks from the main window?	x			
When multiple windows are opened, is it easy for users to switch between windows?	x			
Can users customise the UI to match their liking (e.g. changing colour, font size etc)?		x	1	To a small degree only. Can choose Navigator & Explorer, & can sort columns.
Do users have options to perform a similar task (e.g. via a menu, keyboard or icons)?	x			
8. **System Terminology**				

Are the terms used in Pastel Xpress accounting tool common in the accounting field?	x	
Does the Pastel UI language employ accounting related jargon and avoid computer jargon?	x	
Does the system automatically enter the correct currency sign for monetary entries?	x	
Does the system automatically enter the decimals for monetary entries?	x	
Is the vocabulary appropriate for the intended audience?	x	
9. **Predictability**		
Are Pastel Xpress accounting terms clear and easily understood?	x	
Are the UI components always unambiguous and clear to interpret?	x	

Summary

I have worked with Pastel and taught it for a number of years. The user interface is generally very well designed and consistent. There are only a few problems that need to be improved on. These relate to the GRNs & linking of GRNs to invoices and the problem with dates. The system changes the date back to today's date & the user must correct it each time or it gets posted to the wrong date.

Also the adding of items can be improved, in terms of providing feedback showing items added.

Expert reviewer 3

The purpose of this expert appendix is to present the expert review checklist designed for evaluating Pastel accounting UX and presenting the results from the experts.

The purpose of this expert review is to examine the Pastel accounting's user interface factors impacting on the user's experience as a result of their interaction with the accounting tool basing on the given metrics. Please answer each and every question to the best of your ability. Your input and time spent on answering this expert review is considered very valuable and is highly appreciated. Should you have any questions, you may contact me at Job.Mashapa@nmmu.ac.za or the study leader, Ms Darelle van Greunen at Darelle.vanGreunen@nmmu.ac.za.

The following options may be used to answer the questions on the subsections:

Yes: if you agree with the statement/question in relation to the Pastel Xpress accounting user interface

No: If you disagree with the statement/question in relation to the Pastel Xpress accounting user interface

N/A: If you believe that the statement/question is not applicable to the Pastel Xpress accounting user interface

The following five point scale rating from 0 to 4 is to be used to evaluate the severity of the Pastel accounting tool's divergence form good user interface design principles. In the rating section please rate the severity of the impact on the tool's usability.

0: I do not agree there is a usability problem at all

1: Cosmetic problem only- need not to be fixed unless extra time is available

2: Minor usability problem- fixing this should be given low priority

3: Major usability problem – important to fix should be given high priority

4: Usability catastrophe- imperative to fix this immediately

Comments: The comments section is available to enter any comments relating to the specific statement/question and how it relates to the Pastel accounting user interface. It may also be used to make suggestions for improvement.

EXPERT BIOGRAPHICAL INFROMATION	
Name & Surname	**Job Mashapa**
Home language	**English**
Gender	**Male**
Email Address :	**mashapaj@yahoo.com**
Pastel Version	**Xpress 2009**
Pastel Experience (Expert, Intermediate or Beginner)	**Intermediate**
Usability / UI design Experience (Expert, Intermediate or Beginner)	**Intermediate**

Usability Heuristic	Yes / No / NA	Rating	Comment
1. Attractiveness			
Is the Pastel Xpress accounting user interface structure simple and clean?	X	0	
Do colour choices make it easy for readability?	X	0	
Is the assignment of colour codes conventional from screen to screen?	X	0	Similar windows have consistent colour
Is there good balance between low saturated colours and intense saturated colours between images and background?	X	0	
Is the Pastel Xpress accounting user interface aesthetically pleasing?	X	0	
Have large objects, bold lines, and simple areas been used to distinguish icons?	X	0	
Does the visual layout of objects used show a symmetric match?	X	0	
Does each icon stand out from its background?	X	0	
Are meaningful groups of items separated by white space?	X	0	
2. Help			
Does the system have an online Help function?	X	0	
Is the help function visible? For example, a key labelled HELP or a special menu?	X	0	
Is the help information goal-oriented (what can I do with this program)?	X	0	
Is the help information descriptive (what is this UI component for)?	X	2	
Is the help information procedural (how do I do this task)?	X	2	

Is the help information interpretive (why did that happen)?		X	2	Help facility does not tell how to perform a specific task, searching using the index does not give matching searched item
Does the helpline provide navigational information (where am I)?		X	2	
Is the helpline context-sensitive?	X		0	
Can users easily switch between help and their work?	X		0	
3. Error Tolerance				
Does the system warn users if they are about to make an error?		X		I have not encountered
Are potential errors recognized before becoming a problem e.g. by asking for action confirmation?		X	3	
On error does Pastel accounting tell the user the action needed to recover from the error?		X	3	
Is sound used to signal an error?	X		0	
Are error messages clear and in plain language (avoiding codes)?		X	2	On adding items code field application does not give message to show maximum field length has been reached
Do error messages provide a clear exit point?		X	3	
Usability Heuristic	**Yes / No / N/A**		**Rating**	**Comment**
If an error is detected in a data entry field, does the system place the cursor in that field or highlight that error?		X		
4. Familiarity				
Do the UI icons match with the user's mental model in the real world?	X		0	
Is the Pastel Xpress accounting UI components familiar to what the user uses often, e.g. MS Windows?		X	3	CLOSE command is used instead of SAVE.
Is Pastel accounting familiar UI familiar to the accounting field?	X		0	
Does the UI design of Pastel Xpress accounting make it easy to recognize possible system tasks?		X	2	One need to have proper Pastel training to know how the application operate, not intuitive
Is the menu-naming terminology consistent with the user's task domain?	X		0	
5. Consistence				
Is the assignment of colour codes conventional?	X		0	
Does the keyboard short cuts used conform to the standard traditional short cuts used to perform common functions?		X	1	Ctrl+N, Ctrl+O, Ctrl+S shortcuts not available
Are similar commands presented in similar ways across all task windows?	X		0	

Is the labels location consistent in similar windows and dialog boxes?	X		0	
Is there consistency in the commands used to perform similar specific functions?	X		0	
Is there consistency in font size in all windows?	X		0	Similar windows have similar commands and design
Is there consistency in font colour in all windows?	X		0	
Is there consistency in font type in all windows?	X		0	
Are the common commands used consistent with the general computer terms (e.g. SAVE, OK and close)?		X	2	Close is used in Pastel to save an item
6. Feedback (Visibility of system status)				
Is there some form of system feedback for every operator action (e.g. record saved successfully)?		X	4	No feedback of any sort
Are there observable delays in the system's response time and is the user kept informed of the system's progress?		X	3	No message showing processing progress is given
Is there visual feedback in menus or dialogue boxes about which choices are selectable?	X		0	
Does the system provide *visibility:* that is, by looking, can the user tell the state of the system and the alternatives for action?	X		0	
7. User Control and freedom				
Can users cancel out operations in progress?		X	2	Once in progress a task cannot be interrupted
Is it always easy to return to the main window?	X		0	
Is it easy to navigate to all major tasks from the main window?	X		0	
When multiple windows are opened, is it easy for users to switch between windows?		X	2	The application does not support viewing of multiple documents at the same time
Can users customise the UI to match their liking (e.g. changing colour, font size etc)?		X	2	
Do users have options to perform a similar task (e.g. via a menu, keyboard or icons)?	X		0	
8. System Terminology				
Are the terms used in Pastel Xpress accounting tool common in the accounting field?	X		0	
Does the Pastel UI language employ accounting related jargon and avoid computer jargon?	X		1	The use of complex accounting terms like "batch" make the application difficult for users without accounting background
Does the system automatically enter the correct currency sign for monetary entries?	X		1	Customisation to suite another currency requires to run company set up, this makes it a

				tiresome process
Does the system automatically enter the decimals for monetary entries?	X		0	
Is the vocabulary appropriate for the intended audience?	X		0	
9. Predictability				
Are Pastel Xpress accounting terms clear and easily understood?		X		The terms are can be best understood by people with accounting background
Are the UI components always unambiguous and clear to interpret?	X		0	The presence of mouse over tips makes it easy to understand each component

Appendix J: Submitted Paper

It is a prerequisite requirement that at least one paper is submitted to a conference prior to completion of a Masters degree. This appendix presents a paper submitted and accepted to the International Conference on Information Management and Evaluation. The paper is work in progress based on the results of this research.

User Experience Evaluation Metrics for Usable Accounting Tools

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Abstract: Small Medium and Micro Enterprises (SMMEs) has become an active instrument for poverty alleviation, employment generation as well as economic and social development. However, SMMEs in developing countries operate under effervescent business environments characterised by high inflation rates, poor technology infrastructure, lack of business expertise and resources. There is a need for these organisations to strategically align their business processes for them to adapt and survive in the operating environment turbulence. There are dozens of application software designed specifically to support SMME business processes on the market. On the contrary, software developers pay little attention to the user experience and usability aspects of their products resulting in the packages falling short on overall usability. Highly usable applications improve users' productivity, satisfaction and service quality delivery. Hence SMMEs in developing countries should implement software tools with usable user interfaces. Considering the applications' usability failure it becomes vital to research the user experiences of a typical accounting tool commonly used in developing countries' SMMEs. This paper proposes evaluation metrics that are applicable to evaluate the User Experience (UX) of a chosen accounting tool commonly used in developing countries. The paper introduces a brief background on the current situation in typical developing countries' SMMEs. A discussion on the uses of accounting tools in emerging economies follows with a definition of UX, its facets and evaluation methods. Pilot study results on the UX of Pastel accounting, Xpress 2009 version is presented. The paper culminates with a list metrics applicable to evaluate the user experience of accounting tools and expected future work to improve on the proposed metrics.

Paper Relevance: The paper highlights the importance of user experience as well as usability in the success of accounting tools specific to SMMEs who require the correct tools to ensure sustainability.

Keywords: Usability, User Interface Design, User Experience, Usability, Accounting Tools, Small Medium Micro Enterprises, Developing Countries

Background

Information Communication Technology (ICT) developments, globalisation and world economy integration has cut the global geographical divide and created a one world virtual marketplace. This integration brought stiff competition for customers, resources and suppliers among organisations across the globe. The emergence of computers, the internet and other ICT related technologies has allowed organisations to penetrate both local and international markets (Schmid et al 2001).

Rapid adoption to ICT advancements benefits organisations in the developed in the world economic integration while the developing countries fail to move abreast with technology. This failure results in organisations in the developing countries losing out on competitive advantages and sustainable business opportunities. Current situations typical in emerging economies impede the swift ICT implementation these include socio-technological factors, political forces as well as those internal to the organization. Internal factors include lack of IT infrastructure, lack of business expertise, failure to have collateral assets to acquire capital funding as well as business owner's attitude towards investing in ICT resources. These drawbacks have lead to little adoption of technology in developing countries as compared to their counterparts in the developed world. The little adoption of ICT in developing countries is more pronounced in SMMEs compared to large organisations operating under the same environmental constraints (Cloete et al, 2002).

SMMEs play an important role in economic development. These organisations have often been referred to as "economy growth engines" (Brouthers et al, 1998). Given the increasing need of SMMEs to penetrate in the global market arena, there is need to implement affordable and sustainable SMME specific products.

Computerisation and office automation is happening more frequently in developing countries. Software developers and vendors have realised this increasing emergence of SMMEs and therefore focused on SMME specific products. Examples of such SMME specific products

include accounting tools, payroll management packages, human resources management information systems only to mention a few. Many of these software packages fall short on overall usability, Launder (1995), states that 80% of software maintenance costs are as a result of human-system interaction problems. Poorly designed software applications fail to cope with business process requirements and are highly vulnerable to become immediate legacy systems (Oboler, 2007). Perry (1989) mentions poor user interfaces as one of the major causes of system failures. An investigation into ERP applications with regards to usability by Forrester Research found that many applications fail on overall usability (Gilbert, 2003). In a study conducted by the International Foundation of Science (IFS) to enhance usability, customers revealed that the top challenge they faced was the fact that different parts of their system worked in different ways and required different types of interaction (Matthews, 2008).

Given this usability failure rate, it becomes vital to research the user interface, usability and user experiences of a typical software tool commonly used in developing countries. A good user interface results in reduced costs, increased application package scalability, fewer errors, reduced user disruption, reduced burden on support stuff, elimination of training, and avoiding changes in software after release (Myers, 1994). In a preliminary research on the typical applications used by SMMEs, spreadsheets, word processors, email and Pastel accounting came out to be the most common technologies adopted by such organisations. Proper book keeping and accounting practice is critical for the success of the business. Therefore, it is of prior importance that SMMEs in developing economies should implement accounting tools with usable and appealing user interfaces.

Based on the findings of the preliminary study, this paper investigates the usability and user experience aspects of Pastel Xpress 2009 accounting tool.

1. Accounting Tools

SMMEs in developing countries derive their success and sustainability by implementing affordable and yet effective accounting tools to support their business accounting activities. An accounting tool is a specialised application used to record, analyse, interpret and report business' transactions that are of financial nature (Meigs & Meigs 1981)

The accounting business process is vital for any business to be successful. Accounting is all about keeping track of activities such as how much has been sold, profit generated and cost incurred in business operations. Accounting is of paramount importance in managing

relationships with the outside world. External accounting processes include generation of reports for statutory regulators, government and tax authorities. Various tools can be used to record the accounting business processes. They can be recorded using a manual system (writing in pen and paper), an automated application (in spread sheet and or word processor), an automated special package (commercial accounting application package for example Pastel, Quick Books, and Turbo Cash), or a combination of these. The accounting system therefore needs to be supported by usable tools so as to satisfy the external and internal stakeholders.

The rapid growth of computer technologies over the last decade has made the computerisation of operations essential for almost all organisations. An automated financial accounting system helps to ensure maximum efficiency and effectiveness in recording accounting transactions. Findings from a preliminary study revealed the following accounting processes to be prevalent in developing countries SMMEs.

- Customer and supplier documents processing such as order processing and invoicing.
- Cashbook for recording receipts and payments as well as bank accounts management.
- Inventory management.
- Preparation of financial reports such as balance sheet, tax returns, and income statements.

2. Pastel Express 2009

Pastel Xpress is an accounting tool designed specifically for providing accounting solutions for SMMEs with basic entry accounting needs. By default Pastel Xpress 2009 has the following features:

- supports up to 30 cash books;
- unlimited number of companies;
- accommodates 1 to 3 users at a time;
- supports one inventory store;
- runs on a pervasive database.

Pastel Xpress 2009 has the following default functionalities:

- *Customer and Supplier* documents processing (customer and supplier account details orders, quotations and tax invoices).

- *General Ledger.* The general ledger is the basis of an organization's financial system; it serves as the repository for financial and statistical information.
- *Cash Book* (recording receipts, payments and bank accounts management).
- *Inventory* and the *Business Intelligence Centre (BIC)* (for generating various reports and financial statements).

In addition to the default functionalities the following add on modules can be added at extra cost depending on the organisation's needs;

- Point of Sale
- Payroll
- Bank Manager
- e-Billing and e-Business

Access and navigation to the various system functions can be performed through various options. Figure 1, Figure 2 and Figure 3 show the main window navigation options for Pastel Xpress 2009. Navigation can be in any one of the following options though other ways exists.

- Using the drop down menu bar option. This design is conventional to quite a number of computer applications.
- Using the icons menu bar which presents an iconic view of the related functionalities.
- The third option is having access to the system through the explorer (Figure 3). The explorer present accessible options in a side bar format from which the users can choose what they want to do.
- Alternatively users have a choice of using the system navigator option (Figure 2).

The system navigator presents the functions in a three level labelled section iconic view. The labels tell 'who', 'what' and 'what is within'. Figure 3 below shows the components of navigator option.

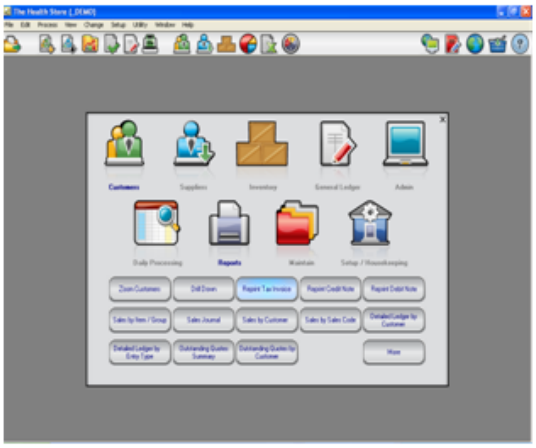


Figure 1: Pastel Xpress 2009 Navigator

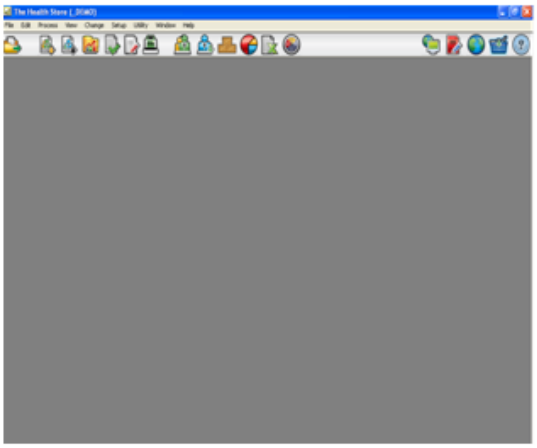


Figure 2: Pastel Xpress 2009 Main Window

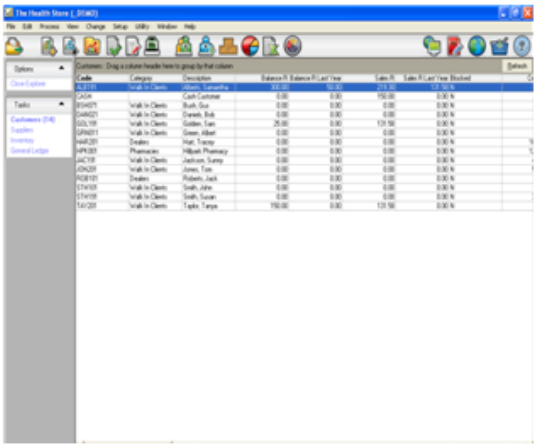


Figure 3: Pastel Xpress 2009 Explorer

Figures 1, 2, 3: Pastel main window navigation options

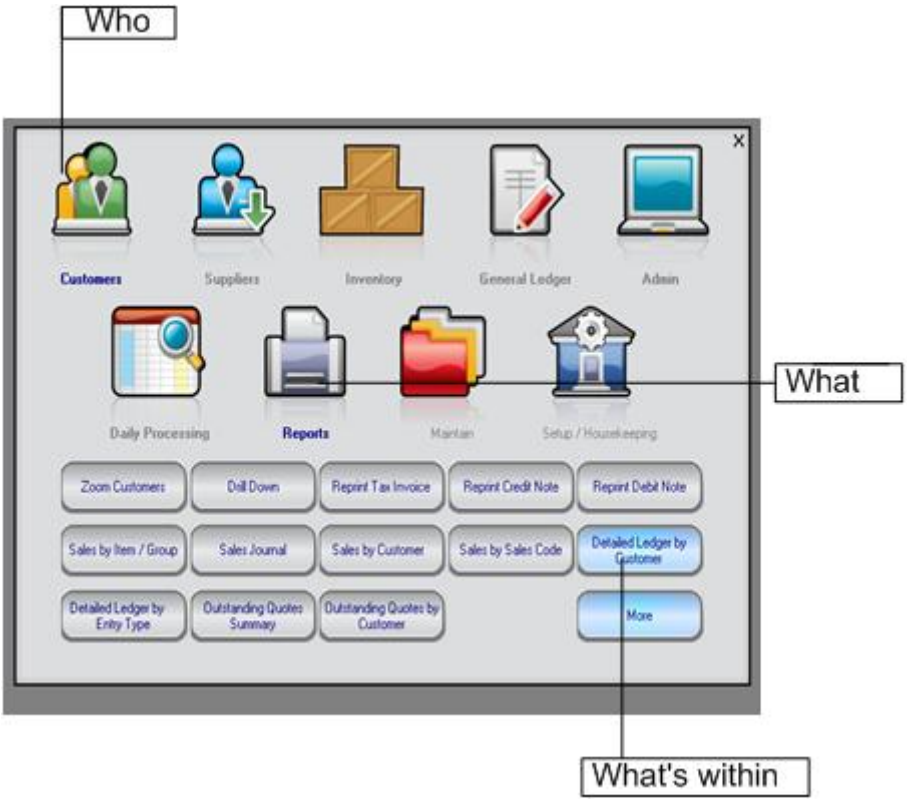


Figure 4: Pastel Xpress 2009 Navigator

In Figure 4 the navigator shows *"who"* is being dealt with in the above case it is the *Customers* option which is highlighted, it goes on to specify *"what"* is to being accessed in customers option, and as depicted it is *Reports* and **"***within"* the reports the user can make a choice of the specific report she or he wants to access.

Since Pastel Xpress has vast and complex features and functionalities, it is essential that the tool must have a robust, easy to use and appealing user interface that promotes a positive user experience. A positive user experience maximizes the value of the SMMEs' investment in the tool.

3. User Experience

Despite the rapid advances in ICT and popular deployment of various computer based applications, the challenge still being faced by software developers is designing for effective user experience. This challenge results in software applications being complicated for the intended users. Users expect to harness the best experience when interacting with computers. They expect the computer applications to be user friendly, satisfactory, familiar, predictable, enjoyable and productively useful for a specific context of use (Microsoft, 1999). However, users have difficulties in finding the functionalities they need; at times the icons used fail to

match the users' mental models and users encounter navigation difficulties hindering them from effectively and efficiently completing their intended tasks. This substantially distracts the users from what they want to do with the application and impact on the overall UX.

Several authors have written on UX, its facets, building blocks and its components and yet there is no generally agreed standard definition for UX. The diversity in definitions is attributed to the multi-faceted nature of UX. UX encompasses aspects of Usability, User Interface Design, Interaction Design, Human Computer Interaction, Human Factors Engineering as well as Information Architecture. With such diversity of the field it makes it difficult to have a universally accepted definition for UX.

Hassenzahl & Tractinsky (2006) define UX as "a consequence of a *user's internal state* (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed *system* (e.g. complexity, purpose, usability, functionality, etc.) and the *context* (or the environment) within which the interaction occurs (e.g. organizational/social setting, meaningfulness of the activity, voluntariness of use, etc.)". Sharp et al (2007) defines UX as how the interaction with the system feels from the user's subjective perspective rather than the usefulness of a system. The Wikipedia definition for UX states "*it is a term used to describe the overarching experience a person has as a result of their interactions with a particular product or service, its delivery, and related artifacts, according to their design*" (Wikipedia). The above definitions have three aspects in common which are; *the user subjective opinion, interaction with the system* and *context of use*. Thus basing on the above definitions, in this paper UX is defined *as subjective personal emotions, feelings and attitudes developed during and or after a user's interaction with a tool to perform a specific task in a specified context*. Such personal derived opinions are referred to as user experience goals which include descriptive terms like satisfying, enjoyable, annoying, confusing, helpful aesthetically pleasing, attractive, etc (Sharp et al, 2007).

Peter Morville's UX Honeycomb (2004) articulates the facets of UX. Figure 4 below is a diagram of the Honeycomb.

Figure 5: The user experience honeycomb (Source: semantic studio)

The above facets aggregate a tool's overall user experience. Focusing on the honeycomb facets this paper aims at proposing metrics to evaluate Pastel Xpress UX. The metrics seek to measures how valuable the application is as perceived by the users. The metrics evaluate the tool's usefulness (relevance in the context of use), credibility, accessibility, easy to find information, desirability and ease to use. An application that is usable promotes the best user experience. Users will enjoy their interaction with an application that is easy to find and access its information and functionalities. Designing a product for desirability and credibility is also important successful positive user experience. Thus this paper seeks to propose criteria for measuring the above stated components of user experience in relation to Pastel Express 2009 accounting tool.

3.1 Measuring User Experience

Due to UX's complexity, evaluating it cannot be a simple straight forward task. There are several methods and criteria for measuring UX. UX evaluation is a means of gaining user's perspectives on how they rate their experience during and after interaction with a tool. UX measuring methods are classified into three categories namely *expert opinion based*, *performance based* and *user opinion based methods* (Tullis and Albert, 2008).

Expert based methods involve experts in UX examining the tool and evaluating the design problems that are likely to hinder the users from having positive UX. Such methods comprise of the following techniques; *Heuristic Evaluations and Expert Reviews* [Nielsen 1994] and

Cognitive Walkthroughs [Wharton et al. 1994]. Heuristic evaluations are guideline based and a verdict of the evaluator's opinion on how well the application appeals for positive user experience. Cognitive Walkthroughs are concerned more on the difficulties users face while using the application to complete a specified task in context of use. Performance based measures involves presenting the users with a list of task scenarios to perform. The users are observed and notes taken with respect to their overall interaction with the system. Parameters that can be measured and recorded include number and percentage of tasks completed, users error rates, count of incorrect icons selected and many more that relate to performance measures. User based opinions makes use of the users subjective rating of their interaction with the system. This can be collected in the form of an post-test subjective questionnaire and interviews where users are asked to comment on their experience on interacting with the system.

4. Case study: Pastel Express 2009 user experience

Section 3 presented user based opinions, expert based opinions and performance based methods as criteria that can be used to measure an application's UX. In this paper section method(s) employed to measure Pastel Xpress 2009 user experience in the recent pilot study on Pastel Xpress 2009 are outlined.

In the pilot study *contextual enquiry methods* were used to determine how users feel and perceive their experience of using Pastel Xpress 2009. The data collecting exercise consisted of direct and indirect techniques (Daniels et al, 2007). The direct method involved presenting participants with a set of tasks to perform. The users were observed as they carried the given tasks. Using the "think aloud" protocol and mouse movement tracking user experience observation notes were taken while users interacted with the tool. A post-test questionnaires based on Nielsen's usability heuristics (Nielsen, 1994) was administered. The questionnaire provided users with an opportunity to rate their feelings and experiences with the tool and formed the foundation for the proposed metrics as outlined in Table 1.

Table 1: Proposed user experience metrics

Metric	Description
1. Subjective Satisfaction	The metric quantifies the user's overall satisfaction on the easy of completing a specific task as well as their pleasure and displeasure from interacting with the systemand displeasure from interacting with the system
2. Consistence	Consistence evaluates whether same function keys perform similar functions through the system. Keyboard shortcuts and commands should match the standard convectional design
3. Attractiveness	Attractiveness as a UX measurement criterion evaluates the subjective opinions on how users find the tool's visual design to be with respect to aesthetics appealing, pleasing and enjoyable to look at. An attractive UI design promotes positive UX.
4. Familiarity	Familiarity, measures how the tools UI elements match the users' mental models basing on their accounting background and prior knowledge of other computer based applications. The UI elements of any application must always match to the users' mental model.
5. Tolerance	The system should always give messages warning of possible errors. On error occurrence the system should give clear and plain language error messages telling the users of the action she / he needs to do to rectify the error. A lenient system boosts the users confidence and overall satisfaction
System terminology	The metric looks at how much of the tool's UI objects (terms, commands labels and messages) do the users find to be common to the context of the tools application. The system should avoid use of computer centred jargon but language that is common to the users.
7. Predictability	The metric evaluates how much the users find the system to behave in a manner which they always expect and predict. While interacting with the system, users should get results they predicted and expected from their action(s). They should not be surprised as to why they are getting results they did not anticipate. A predictable application increases the user's confidence and positive experience
8. Feedback	Feedback as a UX evaluation criterion measures how the users feel the system to be collaborative, communicative and informative of its state during task performance. The metric is concerned with how much the system gives relevant messages on user action within reasonable time. Whenever there is a noticeable delay in the system response, the system should keep the users informed of the processing progress. Also users have to be informed on completion of a task and not left wondering whether the task has been successfully
9. Help	This metric evaluates the helpfulness of the tool's help function. The metric provides a criterion for user's rating on the accessibility of the helpline, how they perceive it to be useful and informative. When stuck users should be able to refer to the helpline and find their way out. The help function should tell the users what they can do with the application, how to a specific task, the function of a specific object as well as how to navigate in the
10. Control and help	This metric provides user to rate on how much they feel to be in control of their interaction with the system. The criterion is concerned with the various navigation options available for users to choose form for example, choosing between using keyboard shortcuts, menu lists or via icons. Control and freedom looks at whether a user can interrupt the system while in progress if need be. A system that places users in control encourages users to

4.1. Case study description

A study investigating the user experience of Pastel Xpress 2009 was conducted during the period May 2009 to September 2009. The research strategy used was *contextual enquiry*. User observations, interviews and post-test questionnaire were used as the data gathering techniques. A total of nine participants currently using Pastel accounting were purposively sampled and recruited to participate in the evaluation exercise. The user observations were conducted individually at the participant's workplace so as to obtain the real user experience in the tool's context of use. The participants worked on an evaluation copy of Pastel Xpress 2009. Several similar companies where opened so as to make the operating environment even. The research purpose and procedure for the test was always communicated to the

participants before the start of the evaluation activity. The exercise was spearheaded by a moderator with the aid of an observer. The purpose of the moderator was to guide and probe questions to the participants while they perform the specific tasks. The observer helped in taking notes on to the participant's interaction with the system.

After the individual's agreement to participate they had to complete a biographical questionnaire. Thereafter Pastel Xpress 2009 main window was launched and the participants were asked to comment on the tool's main window UI design. After commenting the participants were presented with tasks to perform in a similar order. Lastly the participants had to complete a post-test questionnaire rating their overall experience while interacting with the tool.

4.2. Participants' biographical profiles

Participants were further screened based on the biographical questionnaire. Only current users of Pastel accounting (any version) qualified to participate in the study. The biographical data was classified into two categories. The first category consisted of participants' general demographic data. This data was considered not to have direct influence on the tool's user experience. The purpose of collecting such data was to collect typical profiles of SMME accounting tools users. The following data attributes were collected:

- gender
- age
- home language
- general computer experience

The second category of data collected deemed to directly impact on UX is participants accounting background profiles. Data on the following participants' profiles were collected:

- profession
- accounting training
- current version of pastel being used
- level of experience on using Pastel accounting
- duration of using Pastel accounting
- frequency of using Pastel accounting
- experience on other accounting packages beside Pastel accounting

The next sub sections present the participants accounting background profiles data

4.2.1. Which category best describes your profession

Figure 6 below shows the participants' response with respect to their professional occupation.

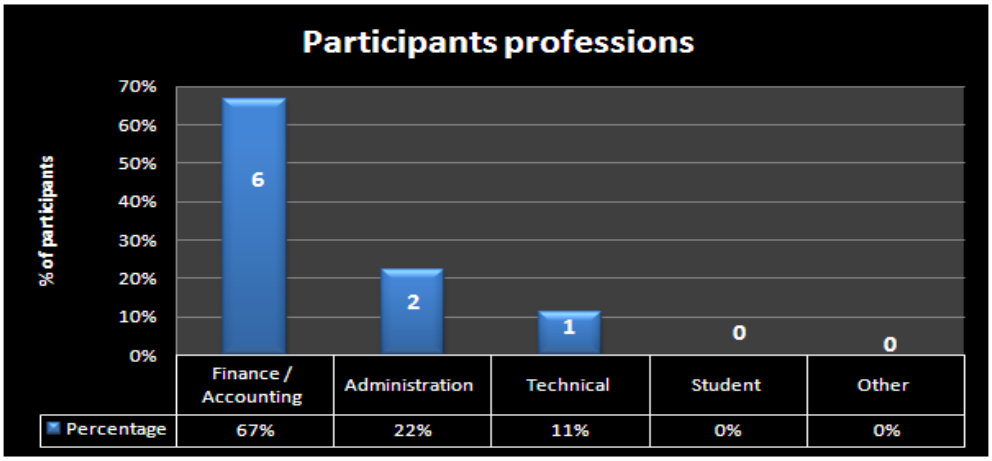


Figure 6: Participants professions

The recruited participants varied in their professions. As shown in Figure 6 above the majority of the participants (67%) are in the finance / accounting sector. Enrolling participants from different professional backgrounds helps in evaluating the UX basing on the participant's context of application use.

4.2.2. Have you ever received any accounting training?

Figure 7 below shows the percentage of participants who had received formal accounting training.

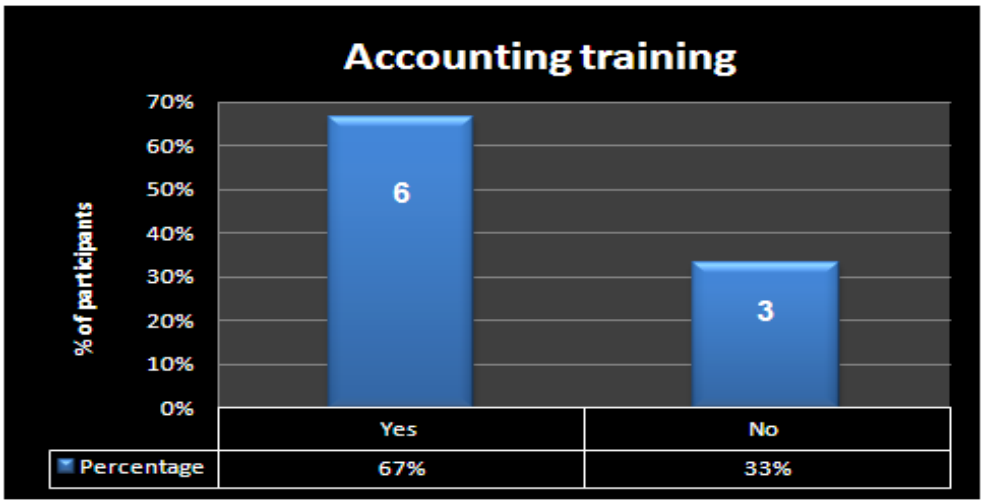


Figure 7: Training on accounting

67% of the participants had some formal training in accounting and use of accounting tools, while 33% indicated they did not have any training in accounting. Training in accounting is the foundation of how the participants find the tool to be in relation to the theory learned.

4.2.4. Have you ever used Pastel Accounting?

100% of the participants responded they had used pastel accounting prior to the evaluation exercise.

4.2.5. If Yes for how long have you used the application?

Figure 8 below shows participants' duration of using Pastel accounting.

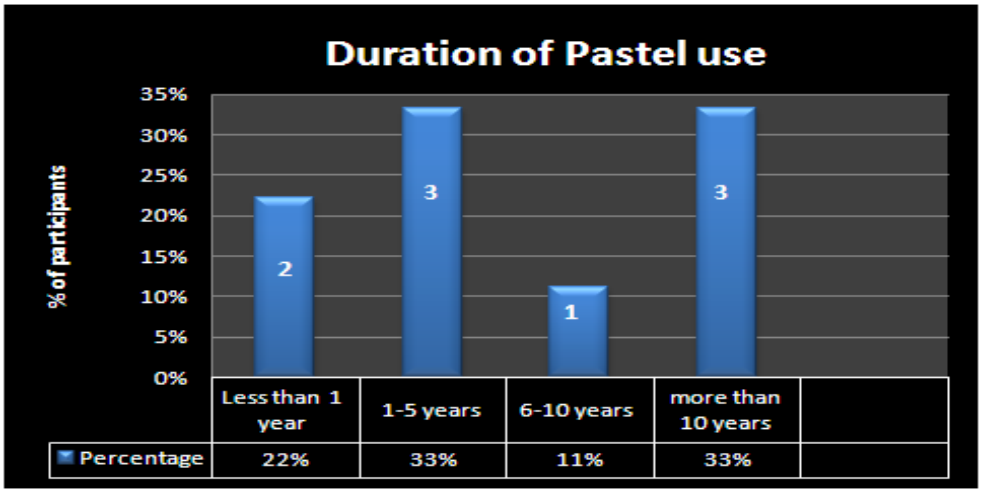


Figure 8: Duration of Pastel use

The duration of using Pastel accounting ranged from less than a year to more than 10 years. UX feedback from a sample having varying durations of interacting with the tool yields expectantly meaningful satisfaction evaluations.

4.2.6. What is your frequency of using the application?

All the participants indicated they use Pastel accounting on daily basis.

4.2.7. How would you rate your level of Pastel experience?

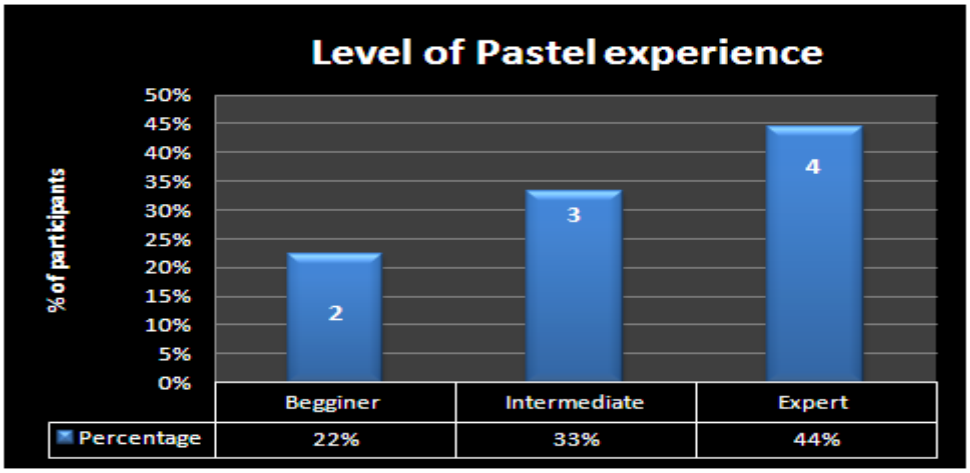


Figure 9: Level of Pastel experience

The participants sample was fairly represented by the different levels of Pastel usage experience. This is vital in evaluating UX at beginner level, intermediate skill level and expert users.

4.2.8. Please indicate the version of Pastel you are currently using.

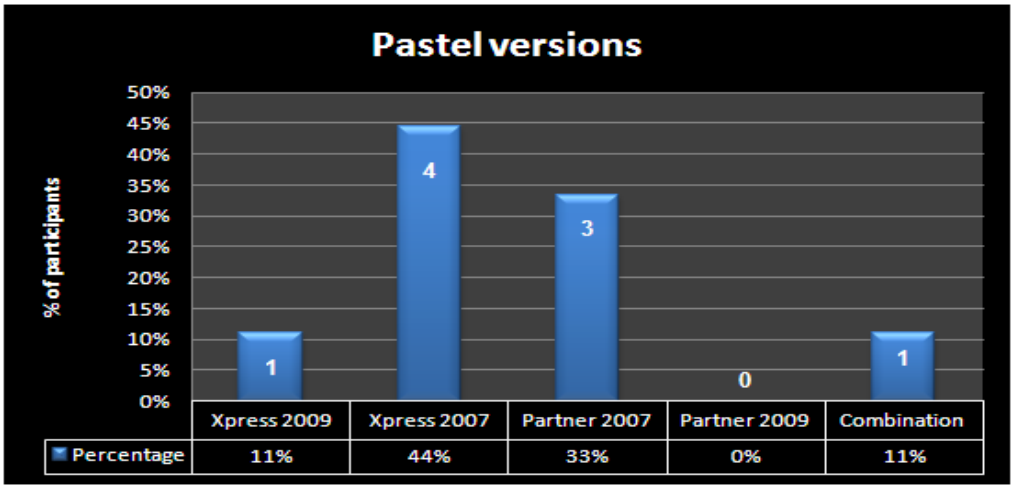


Figure 10: Versions of Pastel

Figure 10 above shows versions of Pastel used by the participants. Recruiting participants using different version of Pastel was important in comparing how the participants felt the using Pastel Xpress 2009. It helps in evaluating consistency in Pastel UI design.

4.2.9. Have you ever used any other accounting software package(s) besides Pastel accounting?

Figure 11 shows participants' response to questionnaire item on whether they had used any other accounting tool besides Pastel.

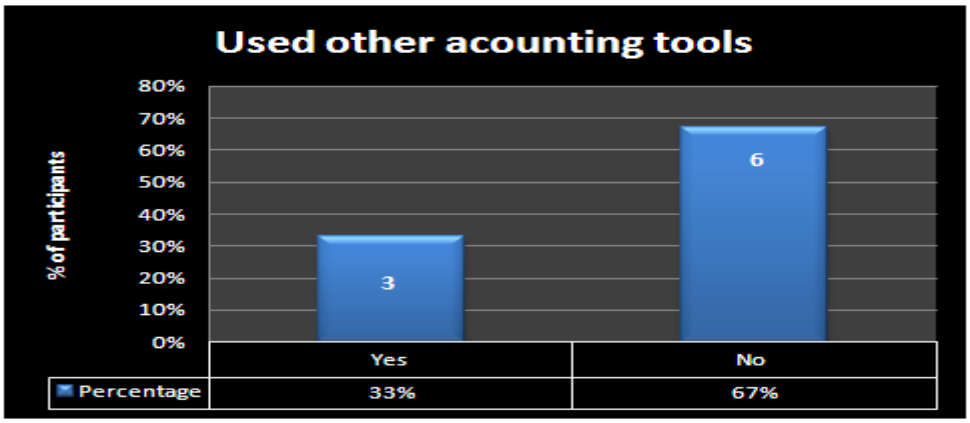


Figure 11: Used other accounting tools besides Pastel accounting

Comments from the participants will motivate further comparative study on UX of other accounting tools developed for SMMEs in developing countries.

As depicted in the above figures the recruited participants had diverse accounting background. Such a diverse sample provides a representation of the tool's overall user experience.

4.3. Warm up Comments

After completing the biographical data questionnaire the participants had to comment on the Pastel Xpress 2009 main window. The comments were based on the UI's attractiveness, appropriateness of icons used, navigation options and any general comments which participants may have relating to the UX. Table 2 is a summary of the aggregated participants' comments.

Table 2: Participants comments

Category	Comments
Attractiveness	Overly the participants were satisfied with the colours used. They commented the main window to be attractive, pleasing, welcoming, not hash on eyes, clean and nice. The participants believed colours help them recognise the task windows
Icons	Generally the participants who do not use Pastel Xpress 2009 version failed to recognise the icons without the aid of mouse over text tips. The participants however liked the presence of the text tips for it makes it easy to recognise icons. The overall comment was that Xpress 2009 icons are different from prior versions. The previous versions icons looks much better, bigger, brighter and relate to tasks much easier than those of Pastel Xpress 2009 version
Navigations options	In a broad perspective the participates prefer navigating using icons. They preferred using the icon bar or navigator option. Icons makes tasks recognition easy and are pleasing to interact with.
General comments	All the 9 participants commented that its never easy for first time users to be competed in using the tool. The tool does not tell the user what to do, one needs proper and extensive training to be competent in using the application. Overly Pastel user interface lacks intuitiveness , however once one knows what to do the application is very pleasing to work with.

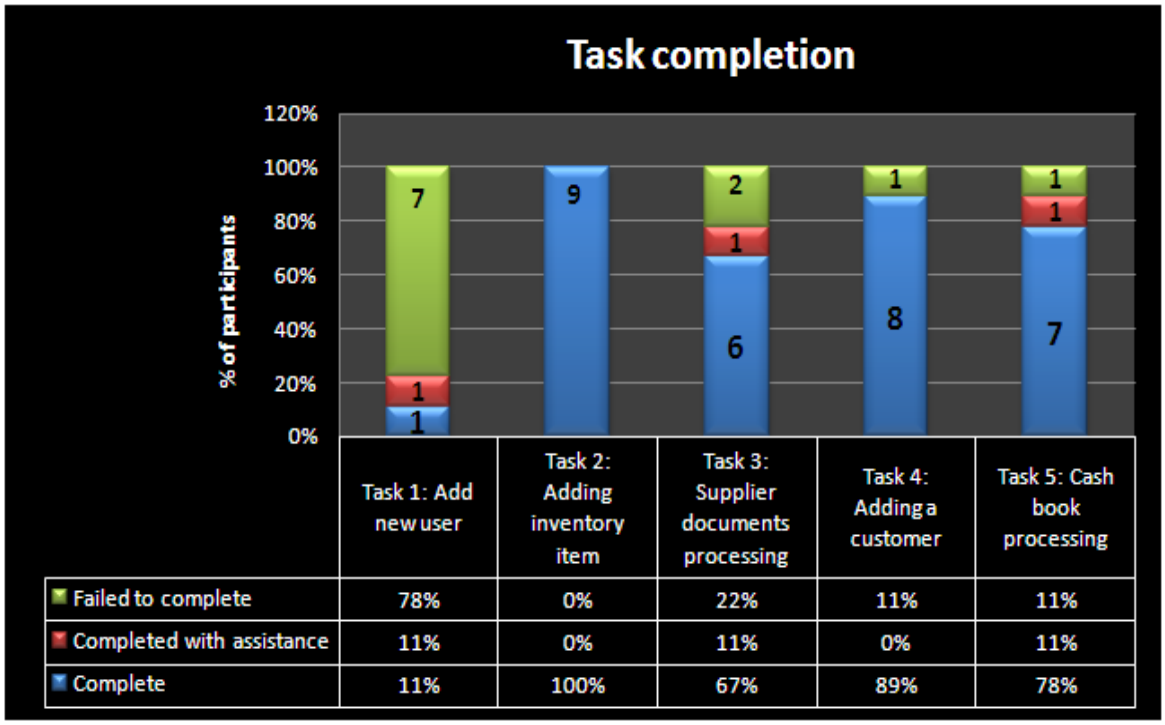
Female participants were more pleased with the colours and visual aesthetics compared to males. What matters most to men is the tool's functionality. In general Pastel accounting received good remarks on the visual aesthetics and colours used. Thus designers need to take note of such preferences in their UI design directions. Pastel Xpress 2009 received poor comments on icons compared to previous versions. The tool lacks consistence from one version to another. Developers need to maintain consistence in their user interface design to avoid confusing users. It was highlighted that the tool is not intuitive and difficult for first time users to understand. Humans are rational beings and their first experience interacting with an application determines their long lasting subjective satisfaction with the tool. Therefore it is important that the Pastel Xpress user interface be designed with first time users in mind, so that they find it usable, easy to use and appealing for a positive user experience.

4.4. Participants Observation

Following comments on the main window, participants were presented with a set of tasks to complete. The purpose of task observation was to evaluate task completion accuracy. The aim was to find out how many participants will accurately complete a given task with or without assistance and how many will fail. Participants' navigation preferences and difficulties impeding them from successful task completion were also investigated. No time bound performance measures were recorded. The participants had to perform the following tasks:

- *Task 1: adding a new user to the system*
- *Task 2*: *adding a new inventory item to the inventory database*
- *Task 3*: *processing supplier documents (purchase order and tax invoice)*
- *Task 4*: *adding a new account customer*
- *Task 5*: *cash book processing (recording receipts and payments)*

A task was completed only if the user managed to enter all the given information and process the given transaction correctly. Failure was as a result of the participant giving up or confirming she / he has completed while she / he has done a wrong transaction. Figure 13 below is a graph showing task completion by the participants.



	Task 1: Add new user	Task 2: Adding inventory item	Task 3: Supplier documents processing	Task 4: Adding a customer	Task 5: Cash book processing
Failed to complete	78%	0%	22%	11%	11%
Completed with assistance	11%	0%	11%	0%	11%
Complete	11%	100%	67%	89%	78%

Figure 12: Task completion

As depicted in figure 13, adding a new user task was poorly performed with 78% of the participants failing to complete the task. The participants failed to get the options to navigate to the required window for adding new user to the system. None of the participants consulted the online help and participants indicated the task was not familiar and they always call support when they need to add a new user to the system. Adding an inventory item and adding a customer to the database tasks were done accurately and with ease. Participants commented that the two tasks had some UI design similarities. Such a consistency in UI

design made it easy to successfully complete the two tasks once one has managed to complete either task. Task 3 and 5 were averagely performed as shown in figure 13.

4.5. Subjective satisfaction questionnaire

The proposed metrics served the purpose of a subjective satisfaction questionnaire which was completed after task performance. The questionnaire used a five point Likert scale rating ranging from strongly agree (1), agree (2), Neutral (3),disagree (4) to strongly disagree (5). The participants rated their level of agreement with the given metric statements. Table 3 summarises the responses of the participants.

The results of the statements relating to user satisfaction suggested that the tool is pleasing to interact with, not complicated and easy to use when performing a specific task. As far as consistency is concerned, the participants indicated Pastel Xpress 2009 to be consistent with the standard convectional design. In general, participants found the user interface to be attractive, simple and clean. The colours used in the application are aesthetically pleasing. Participants had mixed opinions about the familiarity of the tool compared to general computer applications and even other or previous versions of the accounting tool. The results indicated that Pastel accounting does not warn users of possible errors, lacks lenience on errors and does not inform users on action to take to correct the errors. As depicted in Table 3, Pastel design employs accounting context specific terminology and not computer oriented jargon. As far as predictability goes, participants rated the tool to be predictable. Participants indicated that Pastel accounting does not provide users with feedback while they interact with the application. It leaves the users wondering whether the transaction has posted or it is still processing. At times participants closed the application, thinking that the computer had frozen. All participants indicated that the help function was not at all helpful. Participants indicated that they were in control of navigating from one screen to another. However the system does not tell them where to go next to complete a task.

In summary, participants rated the following metrics positively: subjective satisfaction, attractiveness, consistence, system terminology and navigation. Error tolerance, feedback and help were rated to be on the negative user experience end. The participants were neutral on the tool's predictability, control and freedom and familiarity.

5. Conclusion

This study investigated the usability and user experience of Pastel Xpress 2009. Using the proposed user experience evaluation metrics, specific issues relating to the impact of the usability of the user interface design on the actual user experience were identified. These

issues include the following: help is not helpful to users; the tool lacks informative feedback and error tolerance. Participants find the UI of the tool to be attractive, satisfactory and consistent. The participants had mixed experiences of the tool's use of familiar terminology, predictability and control and freedom. The problems identified by the users negatively impacted the overall user experience. Identifying such user experience factors is important for designers to understand how the design of the tool can be improved. The potential benefits of improving on user experience include motivated and effective users with a clearer understanding of their interaction with the tool. This will ardently save SMMEs resources through reduced training costs, uptimes, and sustainability in the competitive and changing environment.

To improve on the credibility of this research, future research will focus on a comparative study of at least three accounting tools commonly used in developing countries. Further user experience methods will be used to include the use of expert based opinions and performance measures to evaluate the impact and applicability of the proposed metrics.

Table 3: Subjective questionnaire participants' ratings

	Count : Answer Value of Participant's Selection				
Question	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree(5)
1. Subjective Satisfaction					
Overall, I am satisfied with the ease of completing this task	4	2	2	1	0
Pastel Accounting system is complicated making it not pleasing to use	0	1	2	0	6
2. Consistence					
Pastel Accounting design is confusing making it difficult to do my work	0	0	2	1	6
I find same function keys to be consistent throughout the system performing similar function	3	1	2	1	2
3. Attractiveness					
Pastel Accounting user interface is simple and clean	3	4	1	1	0
Overall, am pleased with the choice of colours used throughout the application	3	3	1	1	1
4. Familiarity					
This system felt familiar due to my prior knowledge of other computer based systems.	3	1	0	1	3
My background on accounting helped me use Pastel accounting easily	5	1	1	2	0
5. Tolerance					
On errors Pastel accounting error messages indicate the action i need to take to correct the error	0	1	3	2	3
The system always gave me messages warning me of possible errors possible	0	0	3	2	4
6. System terminology					
The terms used in Pastel accounting commands and objects are common in the accounting field	3	3	3		0
I fail to understand some of the terms used in Pastel accounting menus and objects	0	1	2	2	4
7. Predictability					
While performing the tasks I would get results that I predicted and expected	2	4	0	3	0
Sometimes when using a Pastel accounting things seem to happen and I don't know why	3	4	0	0	2
8. Feedback					
At times the system leaves me wondering whether I have successfully completed the task or not	7	1	1	0	0
Whenever there is an observable delay in the systems response, the system keeps me informed of the processing progress	0	0	2	1	6
9. Help					
When stuck I could easily refer to the Pastel accounting help and find my way out	0	0	0	1	8
10. Control and freedom					
Moving between different screens and pages in Pastel accounting was easy for me	4	2	2	1	0
At times I failed to make the system do exactly what I wanted it to do	3	1	1	0	4
At times I did not know where to go next to complete a given task	4	3	1	0	1

References

Brouthers, et al. (1998), "If most mergers fail., why are they so popular?", Long Range Planning, Vol. 31 No.3, pp.347-54.

Cloete, et al. (2002). Small Businesses' Acceptance And Adoption of E-Commerce In The Western-Cape Province of South-Africa. . *Electronic Journal On Information Systems In Developing Countries* , 10(4), 1–13.

Daniels, J. et al. (2007). A Framework for Evaluating Usability of Clinical Monitoring Technology. *Journal of Clinical Monitoring and Computing*, 323–330

Gilbert, A. (2003). Business apps get bad marks in usability.[online] *CNet News http://news.cnet.com/2100-1017- 980648.html*.

Hassenzahl, M., & Tractinsky, N. (2006). User Experience – a Research Agenda. *Behaviour and Information Technolog, Vol. 25, No. 2* , 91-97.

Launder, T. (1995). *The Trouble with Computers: Usability and Productivity.* MIT Press.

Matthew, D. (2008). Usability as an ERP Selection Criterion. [online]*http://viewer.bitpipe.com/viewer/viewDocument.do?accessId=7788041* .

Meigs, W. B., & Meigs, R. F. (1981). *Accounting, the basis for business decisions.* New York: McGraw-Hill.

Microsoft. (1999). *Microsoft User Experience.* Microsoft Press.

Morville, P. (2004, June 21). *Semantic Studios* . Retrieved March 23, 2009, from User Experience Design: http://semanticstudios.com/publications/semantics/000029.php

Myers, B. (1994). Challenges of HCI design and implementation. *Interactions, Vol.1, No. 1 Jan* , 73-83.

Nielsen, J. (1994). Heuristic Evaluation. In J. Nielsen, & R. Mack, *Usability Inspection Methods.* New York: Wiley.

Oboler, A. (2008). Does the purchase and installation of ERP software represent investment in an "instant" legacy system? [online]*http://www.comp.lancs.ac.uk/~oboler/LEGACY2.DOC*

Perry, W. E. (1989). *Handbook of diagnosing and solving computer problems.* Blue Ridge Summit: PA.

Schmid, et al. (2001). Towards the ESociety:E-Commerce, E-Business, E-Government . Zurich, Switzerland

Sharp, H., Roger, Y., & Preece, J. (2007). *Interaction Design: beyond human computer interaction.* John Wiley & Sons.

Sutton, C. N., & Beth, J. (2007). *The Role of Financial Services Sector in Expanding Economic Opportunity. Coporate and Socia Responsibility lnitiative Reoport No.19* . Havard University: Cambridge.

Tullis, T., & Albert, A. (2008). *Measuring the user experience : collecting, analyzing, and presenting usability metrics.* Amsterdam: Morgan Kaufmann.

Wharton, C. E. (1994). The Cognitive Walkthrough Method: A Practitioner's Guide. In J. Nielsen, & R. MACK, *Usability Inspection Methods.* New York: Wiley.