

Factors influencing software piracy in South Africa

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ABSTRACT

It is generally believed that software piracy harms both the software firms (through lower profits) and the buying customers (through higher prices) resulting in increasing efforts to counter software piracy by both software publishers and government. This study attempts to develop a profile of those who illegally copy software and determine the motivational factors underlying software piracy in South Africa in order to design effective measures to counteract software piracy.

The study found that there are factors such as occupation, age, gender and computer expertise that can be used to profile a software pirate. In particular young male business students with expertise in computer usage were found to pirate software more frequently. There is limited support for levels of education or work experience influencing software piracy.

The cost of the software followed by the ease of copying and the purpose of use were found to be strong motivating factors influencing software piracy

Furthermore, the study shows that social acceptance and belief concerning the lack of consequences for software piracy have significant effects on software piracy intentions.

Based on the above findings, anti-piracy campaigns and government efforts to eradicate software piracy should take into account the demographics of software pirates and ensure that the campaign messaging addresses the ethical wrongness of piracy together with stricter enforcements. In addition, software vendors should look at new and innovative ways of bundling additional services to software to allow consumers to feel the value add of purchasing software as opposed to pirating.

DECLARATION

I, Safeya Mahomed, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Safeya Mahomed

Signed at

On the day of 2010

DEDICATION

To my mother Zulekha Mahomed, who inspired me to be a better woman, believe in myself and achieve beyond my dreams. I thank her for her dedication, love and support throughout my life.

To my sisters, Nazerine and Shenaaz who encouraged and supported me throughout my studies – thank you!

To my brother, Yunus, my sincerest gratitude for unfailingly taking care of my daughter each day. May Allah reward you.

To my daughter, Jasmin, whose inner strength and beauty amazes me every day.

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TABLE OF CONTENTS

ABSTRACT	II
DECLARATION.....	III
DEDICATION	IV
LIST OF TABLES.....	IX
LIST OF FIGURES	X
CHAPTER 1: INTRODUCTION	11
1.1 PURPOSE OF THE STUDY	12
1.2 CONTEXT OF THE STUDY	13
1.3 PROBLEM STATEMENT	14
1.3.1 MAIN PROBLEM	15
1.3.2 SUB-PROBLEMS	15
1.4 SIGNIFICANCE OF THE STUDY	15
1.5 DELIMITATIONS OF THE STUDY.....	17
1.6 DEFINITION OF TERMS	17
1.7 ASSUMPTIONS	19
CHAPTER 2: LITERATURE REVIEW	20
2.1. INTRODUCTION	20
2.2 INTELLECTUAL PROPERTY RIGHTS (IPR), THE LAW AND PIRACY DEFINITIONS	23
2.3 PROFILE OF A PIRATE: DEMOGRAPHIC VARIABLES	24
2.3.1 SOFTWARE PIRACY AND GENDER.....	24
2.3.2 SOFTWARE PIRACY AND LEVEL OF EDUCATION	25
2.3.3 SOFTWARE PIRACY AND AGE	26
2.3.4 SOFTWARE PIRACY STUDENT OR EMPLOYEE	27
2.3.5 SOFTWARE PIRACY AND FREQUENT USE OF COMPUTERS	28
2.3.6 SOFTWARE PIRACY AND RELIGIOUS COMMITMENT	28
2.3.7 PROPOSITION 1	29
2.4 MOTIVATING FACTORS: STIMULUS TO ACT.....	29
2.4.1 SOFTWARE IS INTANGIBLE AND/OR NON-EXCLUSIVE.....	30
2.4.2 IT IS SO EASY TO COPY SOFTWARE	30
2.4.3 THE LOW QUALITY OF SOFTWARE AND CONTINUOUS UPGRADES	30
2.4.4 SOFTWARE IS EXPENSIVE.....	31
2.4.5 PROPOSITION 2.....	32
2.5 MOTIVATING FACTORS: SOCIAL AND LEGAL EFFECTS	32
2.5.1 EVERYONE DOES IT	32
2.5.2 IT DOESN'T HARM ANYONE	32
2.5.3 THE RISK OF BEING CAUGHT IS MINIMAL	33

2.5.4	SUMMARY OF THE THIRD SUB-PROBLEM LITERATURE REVIEW.....	34
2.6	CONCLUSION OF LITERATURE REVIEW	34
2.6.1	PROPOSITION 1:.....	34
2.6.2	PROPOSITION 2:.....	34
2.6.3	PROPOSITION 3:.....	35

CHAPTER 3: RESEARCH METHODOLOGY36

3.1	RESEARCH METHODOLOGY	36
3.1.1	QUANTITATIVE RESEARCH	36
3.2	RESEARCH DESIGN.....	36
3.3	POPULATION AND SAMPLE.....	39
3.3.1	POPULATION	39
3.3.2	SAMPLE AND SAMPLING METHOD	39
3.4	THE RESEARCH INSTRUMENT	40
3.5	PROCEDURE FOR DATA COLLECTION.....	43
3.6	DATA ANALYSIS AND INTERPRETATION	43
3.6.1	PROPOSITION 1	44
3.6.2	PROPOSITION 2 AND 3	46
3.7	LIMITATIONS OF THE STUDY.....	46
3.8	VALIDITY AND RELIABILITY	47
3.8.1	EXTERNAL VALIDITY	48
3.8.2	INTERNAL VALIDITY	48
3.8.3	RELIABILITY	49

CHAPTER 4: PRESENTATION OF RESULTS50

4.1	INTRODUCTION	50
4.2	DEMOGRAPHIC PROFILE OF RESPONDENTS	50
4.2.1	OCCUPATION	50
4.2.2	GENDER	50
4.2.3	AGE GROUP	51
4.2.4	EDUCATION LEVEL.....	51
4.2.5	WORK EXPERIENCE.....	52
4.2.6	COMPUTER EXPERIENCE	52
4.3	RESULTS PERTAINING TO PROPOSITION 1	52
4.4	RESULTS PERTAINING TO PROPOSITION 2 AND 3.....	56
4.5.	SUMMARY OF THE RESULTS	59
4.5.1	PROPOSITION 1	59
4.5.2	PROPOSITION 2 AND 3	59

CHAPTER 5: DISCUSSION OF THE RESULTS.....60

5.1	INTRODUCTION	60
5.2	DEMOGRAPHIC PROFILE OF RESPONDENTS	60
5.3	DISCUSSION PERTAINING PROPOSITION 1	61
5.4	DISCUSSION PERTAINING TO PROPOSITION 2.....	63
5.5	DISCUSSION PERTAINING TO PROPOSITION 3.....	64

5.6	CONCLUSION	64
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CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS..... 66

6.1	INTRODUCTION	66
6.2	CONCLUSIONS OF THE STUDY	66
6.2.1	PROFILE OF A SOFTWARE PIRATE	66
6.2.2	MOTIVATIONAL FACTORS INFLUENCING SOFTWARE PIRACY	67
6.2.3	SOCIAL NON-CENSURE AND LIMITED LEGAL RAMIFICATIONS.....	67
6.3	RECOMMENDATIONS	68
6.4	SUGGESTIONS FOR FURTHER RESEARCH	69

REFERENCES 71

APPENDIX A: RESEARCH INSTRUMENT..... 77

APPENDIX B RESEARCH WORK STATISTICAL DATA 80

LIST OF TABLES

Table 1: List of respondents	39
Table 2: List of motivating factors.....	42
Table 3: Respondents per occupation category	50
Table 4: Respondents by gender	50
Table 5: Respondents by age	51
Table 6: Respondents by education level	51
Table 7: Respondents by number of years work experience	52
Table 8: Respondents by number of years of computer experience	52
Table 9: Descriptive statistics of demographic features	53
Table 10: Occupation vs piracy response	53
Table 11: Gender vs piracy response	54
Table 12: Age vs piracy response	54
Table 13: Computer experience vs piracy response	54
Table 14: Religious commitment vs piracy response	55
Table 15: Two sample T-tests results	56
Table 16: Behaviour patterns toward software piracy	57
Table 17: Ranking of attitudes to software piracy factors.....	57
Table 18: Ranked motivating factors for software piracy.....	58

LIST OF FIGURES

Figure 1. 2006 USD Losses from 4th annual BSA and IDC Global Software Piracy Study (May 2006)	13
Figure 2. Software piracy model adapted from (Simpson et al. 1994)	22
Figure 3. Structure of the questionnaire	38

CHAPTER 1: INTRODUCTION

Arguably, the most important development in the last three decades has been the development in Information Technology (IT) (Thong and Yap 1998). This development has resulted in the proliferation of computers at work and at home and allowed organisations and individuals across the globe to increase productivity and resultant profitability. As such many software publishers have become increasingly concerned with protecting their software licences and agreements (Yang, Zhang and Gao 2003). With the increased ubiquity of computers has risen the spectre of software piracy – the unauthorised duplication of commercially available software in order to avoid fees. Software piracy diminishes the revenues and retards investment in research and development, key to any technological innovation (Ram and Sanders 2000). Software publishers have tried various avenues such as unformatted disks (Maude and Maude 1984), laser holes and burns, hot keys (Appelbaum, Nieglos and Oehler 1987) and lengthy licence agreements to prohibit the unauthorised copying. Despite these efforts, as the personal computer industry has grown so has software piracy (Swinyard, Rinne and Kau 1990).

An independent study commissioned by the Business Software Alliance (BSA) in 2006, an international organization of software firms, considered software piracy the industry's worst problem. In 2007, South Africa, with a population of more than 43 million people, spent nearly \$9 billion on information technology (IT) – computers, peripherals, network equipment, packaged software and IT services (IDC Piracy impact study 2008). The IT spending accounted for 3.4% of gross domestic product (GDP), supported more than 14 000 IT companies with nearly 84 000 IT industry employees, and helped generate \$2.9 billion in IT-related taxes. However, the IDC Piracy impact study (2008), indicates that the IT sector's contribution to the South African economy could be even bigger if South Africa's personal computer (PC) software piracy rate were to be lowered by 10 percentage points over the next four years. IDC estimates that this could result in the creation of 1210 additional jobs, \$895 million in local

industry revenue and \$69 million in additional taxes revenues for National provincial and local governments (IDC Piracy impact study 2008)

Some researchers attribute the widespread incidence of software piracy to people's attitudes toward piracy behaviour and peer norms (Cheng, Sims and Teegen 1997). However, current literature leaves unanswered the questions of why individuals' pirate software in South Africa and what is the profile of such a user.

1.1 Purpose of the study

The purpose of this research was to identify the underlying reasons/motivations influencing individuals to engage in software piracy in South Africa and to profile these users. There is much debate about intellectual property rights (IPR), yet it is notable that as yet there has been little work on exploring moral attitudes and reasons for software piracy so as to effectively develop methods to combat it. Although in Tan (2002), he examined the influence of consumers' need, risk and moral judgement on their purchase intention of pirated software – there still remains a gap in existing research.

To address the gap, South African computer users were observed concerning their attitudes towards the unauthorised copying of computer software and attempted to profile such users. To gain an understanding of the software piracy problem, a study was conducted on what motivates individuals to pirate software as opposed to purchasing it. The study further presents an inquiry into the profile of the user and as to whether personal characteristics such as age, educational level, work experience, frequency of computer use and gender of the individual are correlated with his/her piracy or purchasing decision concerning computer software.

By developing a profile of the software pirate, it provides useful insights to those agencies striving to address the problem of software piracy.

Understanding and insight into why individuals purchase or pirate software has clear value for government agencies, software publishers, and the academic

community in developing effective measures to curb this problem (Christensen and Eining 1991). IDC studies has clearly indicated that reducing software piracy can be a strategic tool in creating high paying jobs, increasing tax revenues, expanding economies, and fuelling competitiveness. Moreover it has become widely recognised that in order for future technological innovation to continue unabated, software piracy must be brought under control. This is to ensure that any research and development cost are recouped profitably. Aside from the ethical issues related to software piracy, is the real threat of computer viruses synonymous with illegally copied software (Sims, Cheng and Teegen 1996).

1.2 Context of the study

In a survey of one hundred and two (102) countries, as part of the 4th annual BSA and IDC Global Software Piracy Study (May 2006), the BSA estimated that the illegal duplication, distribution, or sale of commercial business software cost the world wide software industry \$50 billion in lost sales, an estimated increase of 15% over 2005. The study also indicated that while the worldwide weighted average piracy rate is 35%, the median piracy rate is 62%, meaning half of the countries studied have a piracy rate of 62% or higher. In about one-third of the countries, the piracy rate is higher than 75%. Software pirating is so prevalent that some even argue that this behaviour has become socially acceptable (Vitell and Davis 1990).

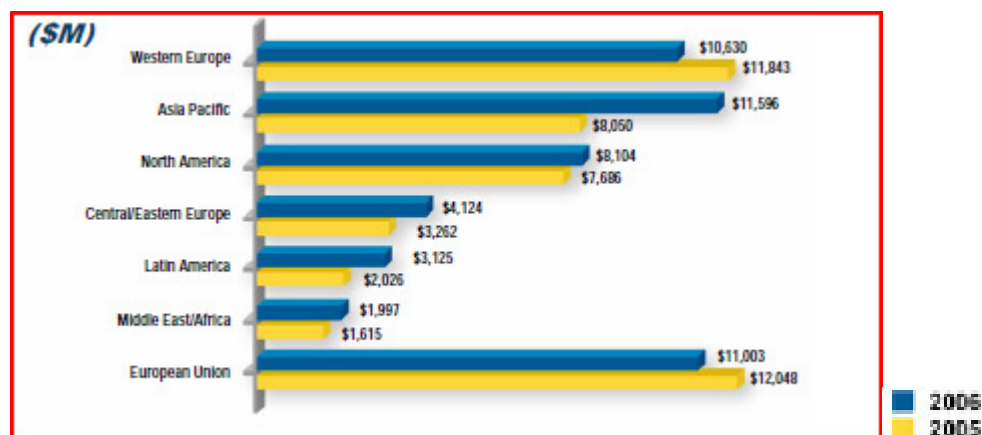


Figure 1. 2006 USD Losses from 4th annual BSA and IDC Global Software Piracy Study (May 2006)

Figure 1 shows the relative ranking by piracy rate of seven regions, which consist of 102 countries and six (6) sub regions as categorised by the IDC. Six of these are mutually exclusive territories; the seventh — the European Union — includes countries in both Western and Central/Eastern Europe (Fourth annual BSA and IDC Global Software Piracy Study May 2006).

There are a number of factors that contribute to regional differences in piracy — the strength of intellectual property protection, the availability of pirated software and cultural differences. In addition, piracy is not uniform within a country; it varies from city to city, industry to industry, and demographic to demographic (Fourth annual BSA and IDC Global Software Piracy Study May 2006).

Software piracy has flourished due to the very nature and characteristics of the Software. Whilst the Software is initially very expensive to produce (R&D investment), its reproduction and subsequent distribution cost is minimal (Bhattacharjee, Gopal and Sanders 2003). Moreover the software has the distinctive characteristics of that of a public good - in that sharing the software with others does not reduce the consumption utility of the product (Ram and Sanders 2000). These very characteristics have facilitated their illegal distribution worldwide. The advent of the Internet and broadband has amplified the problem.

1.3 Problem statement

The growing importance of software piracy and the economic resources used to combat piracy has spurred a number of research studies on the behavioural understanding of software piracy activity in the United States (US) and abroad (Simpson, Banerjee and Simpson 1994; Osorio 2002; Villazon 2004). However, these studies have not profiled the individual that typically pirates software nor indicated the motivations behind the software piracy. Very few studies have been performed linking culture, attitudes and personal characteristics of ordinary end-users to understanding why some computer users choose to make unauthorised copies of computer software. In addition studies exploring the

underlying reasons why people regard the unauthorised copying of computer software as morally acceptable or unacceptable are also few (Cheng et al. 1997). Only two studies, by Cheng et al. (1997) and Seale, Polakowski and Schneider (1998) explore user rationales concerning the unauthorised copying of software, and neither was conducted in Africa. In order to fill this gap in the literature, a study was conducted to investigate the reason and attitudes of South African computer users towards the unauthorised copying of computer software and profile a typical “pirate”. Studies have found that there are differences between attitudes about software piracy among different demographic variables (Kini, Ramakrishna and Vijayaraman 2004).

1.3.1 *Main problem*

The purpose of this research was to profile individuals that engage in software piracy, identifying the underlying reasons/motivations for doing so as well as determining the sociological aspects influencing the reasons/motivations for software piracy in South Africa.

1.3.2 *Sub-problems*

1. The first sub-problem is to determine the profile of individuals that engage in software piracy using demographics and other variables
2. The second sub-problem is to identify the underlying reasons/motivations influencing individuals to engage in software piracy in South Africa
3. The third sub-problem is to identify the sociological aspects influencing the reasons/motivations for software piracy.

1.4 Significance of the study

Piracy has a detrimental effect on the incentive to produce intellectual property (Ram and Sanders 2000). Moreover, technology is a fundamental driver of economic growth around the world. Software piracy has many negative economic consequences: local software industries are crippled by competition

with pirated software from abroad, and lost tax revenues and jobs from lack of a legitimate market (Givon, Mahajan and Muller 1995). These costs reverberate up and down the supply and distribution chains (Traphagan and Griffith 1998).

The issue of piracy is even more prevalent in emerging markets such as South Africa which is faced with a rapid influx of new PC users in the consumer and small business sectors (Carmel 2003), the increased availability of pirated software over the internet, peer to peer networks and the difficult enforcement and education across the country (Bhattacharjee et al. 2003).

In order to unlock new jobs, business opportunities, revenues and economic growth that the IT sector can produce, tangible steps need to be taken to protect intellectual property and reduce software piracy.

Understanding why individuals purchase and pirate software has clear value for government agencies, software vendors, and the academic community in developing effective measures to curb this problem. Furthermore, understanding the reasons why individuals choose to pirate software, be it the widespread nature or the cost of the software, can lead to the implementation of effective anti-piracy strategies.

The impact of demographics and profiling of users on ethical behaviour appeared to be an important area for future research (Simpson et al. 1994). In addition, situational and personal variables should be identified and examined for their impact on software piracy behaviour. Cheng et al.'s (1997) study represented an attempt to identify underlying reasons/motivations for people to pirate software but indicated that future studies should expand to take into account demographics and other variables, particularly software prices.

Understanding why individuals purchase or pirate software has clear value for government agencies, software publishers, and the academic community in developing effective measures to curb this problem (Christensen and Eining 1991). IDC studies has clearly indicated that reducing software piracy can be a strategic tool in creating high paying jobs, increasing tax revenues, expanding economies, and fuelling competitiveness. Moreover it has become widely recognised that in order for future technological innovation to continue

unabated, software piracy must be brought under control. This is to ensure that any research and development cost are recouped profitably. Aside from the ethical issues related to software piracy, is the real threat of computer viruses synonymous with illegally copied software (Sims et al. 1996).

1.5 Delimitations of the study

This study solely focused on software and not other communication media such as music or films. It is also limited to the behaviour of natural persons and does not include corporate or public institutions.

1.6 Definition of terms

List of definitions and abbreviations

Piracy : Unauthorised copying, reproduction, usage, or manufacturing of packaged software and can run the gamut from unauthorised copying or downloading of software or purchasing software copied illegally, to corporate overuse (more clients than paid for) of licensed software (IDC 2006)

Piracy Rate: Percentage of packaged PC software installed in a country without a license. Use of open source software is accounted for in the calculations and is considered licensed, legal software (IDC 2006 survey)

Piracy Loss: Losses due to software piracy are estimated by assuming that for each new personal computer sold there will be a set of accompanying software sales. For instance, to make the PC work the user must buy an operating system, and to make the PC useful the user would have to buy a set of productivity software, such as a word processor, and so on. On this basis, the shortfall between expected and actual sales must be due to software piracy, and the cost of these missing sales represents the financial loss to the software industry (Moore and Dhillon 2000).

Softlifting: Installing software with a single-user license on multiple machines, and is the most common example of software piracy within businesses (Trevor 2003)

Commercial software: Specialised/Generic software development with ownership rights (Bessen 2005). This is software that can be purchased off the shelf (Carney and Wallnau 1998). Access to the software code is restricted (Lassila and Brancheau 1999).

Open Source Software (OSS): Open source software, developed by volunteers (software contributors), is the private provision of public goods (Bessen 2005). It holds the right to make copies of programs and distribute these copies; the right to have access to the software's source code to make changes/improvements. These rights keep all the software contributors on the same level. Everyone is allowed to sell an OSS program keeping prices down. Any programmer can tailor an Open Source program to specific markets in order to reach new customers. People who do these things are not compelled to pay royalties or licence fees (Perens 1999).

Free and Open Source Software (FOSS): Free and open source software (FOSS) complements proprietary provision, rather than replacing it. FOSS is a broad term used to embrace software that is developed and released under either "free software" or an "open source" license. Both Open Source and Free Software are free in two senses: "free as in speech", meaning that the code may be redistributed and reused, and "free as in beer", meaning that the

software is available for download without charge (Crowston, Howison and Annabi 2006).

IPR: Intellectual Property Rights

IT: Information Technology

SPA: Software Publishers Association (Trevor and Gurpreet 2000)

SIIA: Software and Information Industry Association (a merged organisation between SPA and Information Industry Association) (Moore and Dhillon 2000)

BSA: Business Software Alliance – BSA is a network of software manufacturers and includes such companies as Microsoft and Novell (Husted 2000)

Knowledge workers: “The term ‘knowledge worker’ describes someone who adds value by processing existing information to create new information which could be used to define and solve problems. Examples of knowledge workers include lawyers, doctors, diplomats, law makers, marketers, software developers, managers and bankers...” (Drucker 1999:95)

1.7 Assumptions

The following assumptions have been made regarding the respondents:

1. Respondents are familiar with software piracy and are able to adequately respond to the questionnaire
2. The sample reflects normal perspectives of and experiences of computer users.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

The economic threat of software piracy has resulted in the formation of several strategies and institutions such as Business Software Alliance (BSA) and Software Publishers Association (SPA), to protect the economic interests of software companies, professional organisations, government and individuals (Moore 2003). These organisations primarily focus on ethics education of the public, effective enforcement, and software piracy legislation. The question of whether or when it might be permissible to disregard copyright and make unauthorised copies of software has been much debated amongst scholars (Mikko and Tero 2007). There is however a need to identify the underlying factors such as resource constraint, personal gain, social norm, environmental stimulus and legal factors that would help these organisations reduce the effect of piracy.

When considering why existing and potential computer users pirate software, the literature suggests a number of reasons. Empirical research by Villazon (2004) suggests self-improvement and work-related performance spearheads piracy, whilst also suggesting the high price of software and peaks of software demand are contributing factors that affect the propensity to commit software piracy.

Moreover, the same research suggests that software piracy falls within the ambit of ethical decision making and hence as technology continues to advance understanding the implications of making ethical decisions have become a critical issue (Villazon 2004).

The growing importance of software piracy and the economic resources used to combat piracy has spurred a number of research studies on the behavioural understanding of software piracy activity in the United States (US) and abroad. However, these studies have not profiled the individual that typically pirates software nor indicated the motivations behind the software piracy. In order to

launch an effective campaign against software piracy it is important to identify and isolate those factors typically seen as motivating software piracy (Moore and Dhillon 2000).

Very few studies (Limayem, Khalifa and Chin 2004) have been performed linking culture, attitudes and personal characteristics of ordinary end-users to understanding why some computer users choose to make unauthorised copies of computer software. In addition studies exploring the underlying reasons why people regard the unauthorised copying of computer software as morally acceptable or unacceptable are also few (Cheng et al. 1997). Only two studies, by Cheng et al. (1997) and Seale et al. (1998) explore user rationales concerning the unauthorised copying of software, and neither was conducted in Africa. In order to fill this gap in the literature, a study will be conducted to investigate the reason and attitudes of South African computer users towards the unauthorised copying of computer software as well as attempt to profile a typical "pirate".

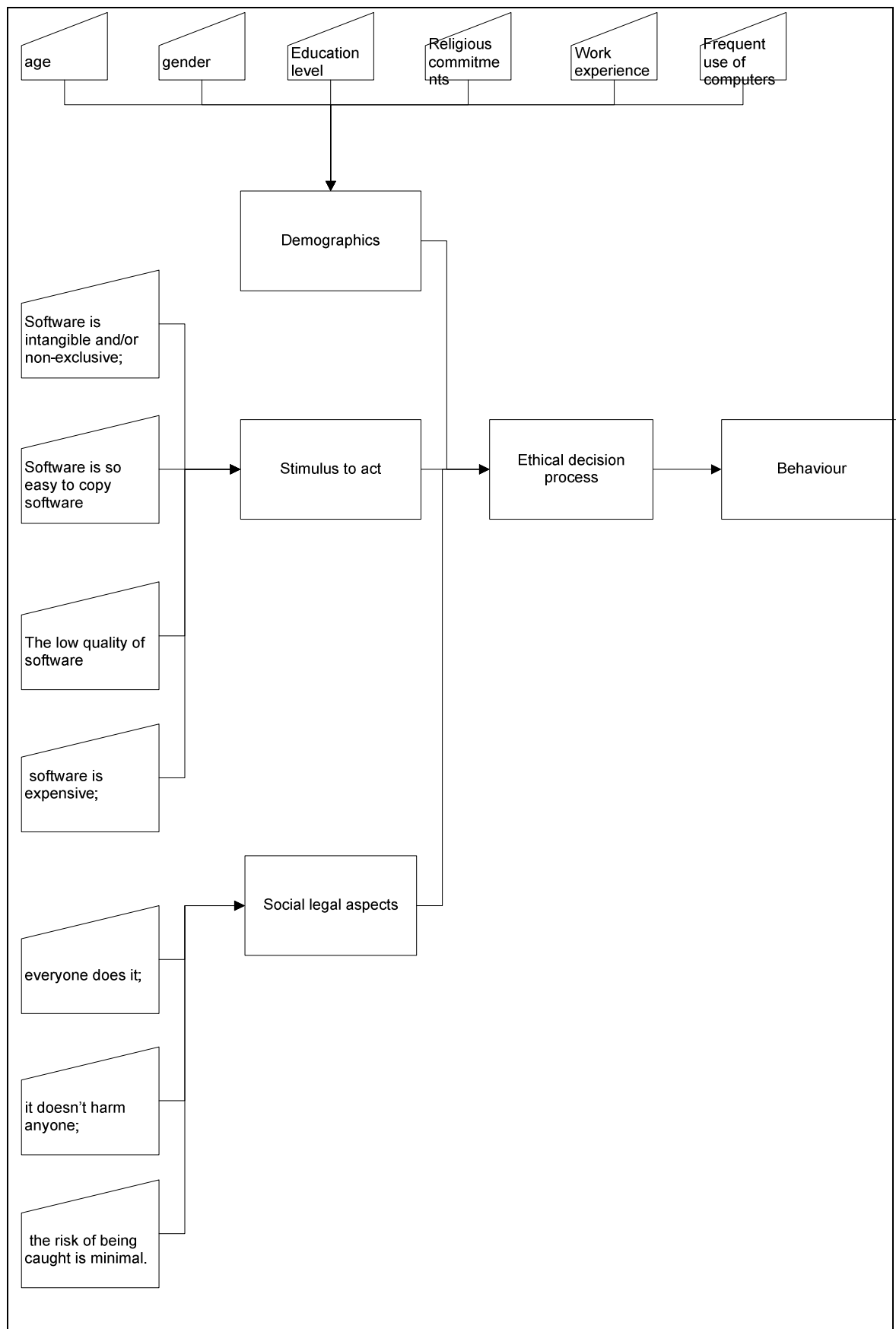


Figure 2. Software piracy model adapted from (Simpson et al. 1994)

2.2 Intellectual Property Rights (IPR), the law and piracy definitions

The rationale behind allocating intellectual property rights (IPR's) to the creator of a work balances the interests of the creator, by ensuring that he/she still has an incentive to create as well as allowing the flow of information to be unhampered (Teljeur, Trade and Strategies 2003). In addition these rights are finite and eventually place the innovation in the public domain. The IPR seek to prevent the misappropriation of the economic returns belonging to the creators, aim to promote technological innovation as well as restrain the excesses that may result from monopolised knowledge (Teljeur et al. 2003).

The legal basis for software piracy being illegal is based on the conviction that buying and selling pirated software is essentially trafficking in counterfeit goods (Buscaglia 2001). Most countries provide legal protection for software by extending copyright, patent, contract and trade secret legislation, and by recognizing software as another type of literary and artistic work subject to IPR protection. The World Intellectual Property Organization (WIPO) Copyright Treaty governs international protection for IPR under the auspices of the World Trade Organization.

The South African copyright law is currently contained in the Copyright Act No. 98 of 1978. Amendments have been in progress for over six years, but the amendment process has always stalled.

The principal deficiencies in the 1978 law are:

- Lack of criminal penalties for end user piracy - South African law currently provides that the sale of infringing software is a criminal offence, but there is no criminal penalty in the end user context (Microsoft 2003)
- Non-deterrent civil damages - South African law permits infringing end users to pay damages that are less than the infringer would have paid, had he/she bought licensed software (Microsoft 2003).

This study primarily focused on “Softlifting” i.e individuals installing software with a single-user license on multiple machines. This is the most common example of software piracy (Simpson et al. 1994).

2.3 Profile of a pirate: Demographic variables

Software piracy, has received increased attention as a form of unethical behaviour in recent years (Wagner and Sanders 2001). Recent research has suggested that it is the individual computer user who ultimately makes the decision whether or not to attempt to illegally copy software (Solomon and O'Brien 1990). Highland (1983) profiles the computer criminal as typically young, skilled, and knowledgeable, overqualified and an elitist that believes that their use of the computer is not harmful to anyone. Sims et al. (1996) noted that there is very little research on the demographic makeup of a software pirate, but much can be gleaned from research that attempts to marry demographics to people's ethical behaviour.

2.3.1 *Software piracy and gender*

The gender of the offender in discussions of business ethics and software piracy is one aspect frequently ignored (Sims et al. 1996).

In a study on professional ethics amongst business students, Davis and Welton (1991) found no significant differences between male and female students and their ethical beliefs. According to their findings, ethical beliefs of male and female students are very similar (Davis and Welton 1991). In addition further investigation on education levels revealed that male and female students are similar with their perceptions on ethical behaviour.

In Kidwell, Stevens and Bethke (1987), the study sought to determine if there were ethical differences between men and women and if they do exist, in which areas. Data was gathered from 50 male and female managers via a self-administered questionnaire wherein distinctive demographics were noted. The study concluded that there were no significant differences between male and female responses except in the area of error concealment where a greater

margin of females viewed it as unethical when compared to males (Kidwell et al. 1987).

Conversely, Sims et al.'s (1996) study on demographic factors and unethical behaviour in general and on software piracy in particular found a significant difference between male and female in terms of the extent to which they pirate software. In terms of the study males had pirated software more often than their female counterparts and male piracy across various applications such as word processing, spreadsheets, data base management, etc. was also significantly higher. The study went on to indicate a reason for this phenomena is that women conceptualise moral questions as problems of care involving empathy and compassion and men conceptualise them as problems of rights (Sims et al. 1996).

Wood and Glass (1996) as cited by Villazon (2004) suggested in their software piracy research study on sex as a determinant of software piracy that women displayed more ethical sensitivity and behaviour. Villazon (1994) went on to indicate that the results of the Wood and Glass (1996) study indicated that the differences between the sexes' behaviour was most notable in that female students were less likely to allow copying of software regardless of price being more concerned with the consequences of illegal copying. Paradoxically females were unlikely to condemn such copying either.

As a result, additional research is warranted on gender and software piracy to refine the profile of a pirate.

2.3.2 *Software piracy and level of education*

Prior research has shown that there is a significant relationship between an individual's level of education and software piracy (Im and Koen 1990). Education has always been seen as an influential factor in human behaviour (Im and Van Epps 1992). Davis and Welton (1991) conducted a study examining whether college education changes and improves the ethical attitudes and perceptions of individuals. The study found that there was a difference between the ethical perceptions of lower versus upper division students indicating that

education may well play a role in ethical decision making. The study however, did not find any significant ethical behaviour differences between seniors and graduate students.

In Wee, Tan and Cheok (1995), it was submitted that the higher the individual's educational level, the likelier they were to pirate software. This is explained due to the individual's increased use of computer technology in an educational and business environment (Wee et al. 1995).

Conversely, Kohlberg (1973) as cited by Davis and Weldon (1991) stated that there was no evidence that ethical confusion is resolved with the highest level of education. Other research relating to ethics education has shown ethics training has no demonstrable impact on the moral reasoning of individuals (Villazon 2004).

Consequently, the study investigates whether education has an effect on the propensity to commit software piracy.

2.3.3 *Software piracy and age*

Some research studies have suggested that there exists a relationship between software piracy and age. The Sims et al. (1996) study developed a profile of a student software pirate and also found that older students pirate more often than younger students. Oz (1990) as cited by Sims et al. (1996:841) indicated that the problem of software piracy begins "before the young person becomes a practicing manager". Other research studies found people who have been employed in the work force longer tend to behave in a more ethical manner (Kidwell et al. 1987). Sims et al. (1996) suggested that a student's perceptions of proper ethical behaviour mature towards society's expectations during the course of university life. The above findings support what has become an accepted belief that younger individuals are more likely to commit software piracy (unethical behaviour) than older individuals (Highland 1983). This is in line with other research findings on the relationship between ethics and age in general.

However, Oz (1990) found no significant difference based on age and software piracy between undergraduates (younger students) and graduates (older students).

The mixed results on the relationship between age and software piracy, in particular and unethical behaviour in general suggests the need for additional research if one is to use age as a characteristic in profiling those who illegally copy software.

2.3.4 *Software piracy student or employee*

In a study conducted on high tech students by Athey (1993), it was found that students in high tech majors have significantly different ethical opinions than older, more experienced experts. The study goes on to suggest the reason being that students simply have less work experience than the experts and have therefore never faced the real life issues (Athey 1993). Pallette (1986) suggested that software piracy is more prevalent in academia than in business. Slater (1991) as cited by Sims et al. (1996), was the first study to examine students' behaviour relative to computer based situations and found that more than 300 business students admitted to using computers unethically including hacking and illegal copying of software (Sims et al. 1996).

Other researchers, Walstrom (2006) and Oz (1990), have indicated that software piracy is a widespread phenomenon among business students taking Management Information Systems/Computer courses, and that it is viewed as socially acceptable by a significant portion of such students (Solomon and O'Brien 1990).

In Cook (1986), it is suggested that the curricula on ethics lacks teaching the students on how to deal with ethical decisions. Furthermore it is suggested that students are not told what is expected of them in using both computer hardware and software as well as the relevant laws pertaining to software piracy (Cook 1986).

Based on the above research, it would seem that educational institutions are breeding grounds for software pirates yet most educational institutions emphasise the ethical issues of copyright material. Students are warned at the beginning of each course and consistently throughout the course not to illegally copy material that is the intellectual property of others. Sims et al. (1996) note that student software pirating behaviour will be carried into their business careers.

2.3.5 *Software piracy and frequent use of computers*

Research has suggested that there is a relationship between software piracy and the familiarity of the computer i.e. those individuals that frequently use computers have a greater respect for the complexity around computer programs and hence may be willing to pay for them (Eining and Christensen 1991).

In Sims et al. (1996), the study found to the contrary in that those who used computers more often pirate across software types.

This study further explores the relationship between frequency of computer use and software piracy.

2.3.6 *Software piracy and religious commitment*

In Villazon (2004), religious commitment was defined as religious beliefs that can affect behaviour and attitudes. The research went on to indicate that religious commitment could be either intrinsically or extrinsically orientated. Intrinsically motivated persons live their religion, while extrinsically orientated individuals use their religion for moral appearances and social convention (Logsdon, Thompson and Reid 1994). Knotts, Lopez and Mesak 2000 as cited by Villazon (2004) indicated the following (based the study of religion as an influential factor on ethical judgements):

- In individuals that lived their religion (intrinsic orientated), religion exerted a significant influence;

- Religious affiliation is not as important in ethical decision making as religious commitment.

However, Simpson et al. (1994), in developing a model for potential determinants of software piracy, found that religion significantly influenced the propensity to pirate software.

This study further explores the relationship between religion and the decision making around software piracy.

2.3.7 Proposition 1

It is possible to demographically profile/model individuals likely to pirate software based on the following: gender, age, level of education, work experience, frequency of computer use and religious commitment.

2.4 Motivating factors: stimulus to act

In the context of software piracy, individuals that pirate software believe that there is more to gain from software piracy. Such gain can be comprised of monetary gain, increased knowledge, entertainment purposes and competitive edge (Villazon 2004).

There are many factors that can result in the decision to pirate. Simpson et al. (1994:433) provided an example of how factors of reward and punishment can be applied to software piracy by stating “the fact that the software is too expensive to purchase, and the simple fact that the individual was given the software are all stimuli that could invoke the ethical dilemma of whether or not to pirate software”.

Set out is a literature review of the attitudes and motivating factors that may cause individuals to use illegal software.

2.4.1 *Software is intangible and/or non-exclusive*

With the advent of the internet and widely available broadband, it has become acceptable to think of software as being non-exclusive in nature. This reason is cited as morally acceptable for the unauthorised copying of software (Mikko and Tero 2007). According to this argument, software cannot be bound by ownership or copyright, because software products are immaterial products.

2.4.2 *It is so easy to copy software*

The likelihood of purchasing pirated software increases as pirated software is readily available and easy to purchase (Gopal and Sanders 1998). Availability refers to the perceived ease with which pirated software can be bought. Furthermore, if an illegal product is widely available there can be little doubt in the mind of the purchaser that they are doing something illegal.

Peer-to-peer piracy, such as seen in the music industry, where users share software using CDs or the Internet as well as SPAM emails solicit the idea of making a “cheap” software purchase. Many of these are likely suspect transactions.

There is full packaged product, or “counterfeit” software, where someone has taken the time to replicate the software and packaging for resale in order to dupe customers into thinking it is genuine (Seale et al. 1998). There are unscrupulous resellers in the channel – system builders that load unlicensed software onto computers and sell them.

Software piracy is a unique and difficult problem due to the inherent features of personal computers. Copying software requires simple commands and the duplicated software is not appreciably diminished (Cheng et al. 1997).

2.4.3 *The low quality of software and continuous upgrades*

The reliability and security surrounding software brings into focus the low quality of the software (Mikko and Tero 2007). Another bone of contention that arises and spearheads piracy is the continuous need for upgrades and patches (Athey

1993). This may have been prevalent in the past but with advanced technology the perception around low quality software should abate.

This study determines if the above holds true as a key reason for pirating.

2.4.4 *Software is expensive*

It is believed that if the cost of software is beyond the purchasing power of those who would like to use it, pirated software provides an alternative (even though it is illegal) means of gaining access to the software. Digital goods have high initial production costs, and very low – approaching zero – reproduction costs (Bhattacharjee et al. 2003). Cost refers to the perception that software vendors are charging too much for the software.

Many countries, particularly those without a viable local software industry, find it counterproductive to thwart piracy. Software piracy allows them to quickly and inexpensively acquire the latest software products, and keep up-to-date with the advancing technologies. While the threats of trade sanctions have coerced many countries to enact copyright laws, they are rarely enforced (Ram and Sanders 2000).

The most common reason offered for pirating software is the high cost of legal software (Trevor 2003). SIIA's fight against software piracy, however does not acknowledge this.

Additionally it would seem that IPR Legislation impacts the price of software. IPR essentially increase the market power of suppliers of technological innovation, allowing them to reap monopoly rents for a limited period of time (Teljeur et al. 2003). Therefore consumers in importing countries can face increased prices when IPR legislation is strengthened.

It is a fundamental economic principal that the way to maximize profits is to charge a price that equates to the value of the product to each consumer, instead of a uniform price that is charged to all consumers. Prices are set in the US (for US home markets) with little or no consideration on affordability in developing countries. The low value of willingness-to-pay among these

consumers requires pricing policies comfortably afforded by this consumer base.

Many consumers around the world realise that piracy has a detrimental effect on the incentive to produce intellectual property and is wrong from both a legal and moral standpoint. They also realise the very positive benefits derived from having supported software. However, if the cost of the software is not close to the consumer's reservation price-the willingness-to-pay-then piracy may be the order of the day (Ram and Sanders 2000).

2.4.5 *Proposition 2*

Literature suggests that there are a number of stimuli (motivating factors) inherent in software products that lend itself to piracy including tangibility and non-exclusivity; ease of copying; accessibility by being readily available and cost.

2.5 Motivating factors: social and legal effects

2.5.1 *Everyone does it*

In Mikko and Tero (2007), it was found that 15% of respondents indicated that the reason for copying software was the perception that “everyone does it”.

In addition Husted (2000) found that moral reasoning had a weak relationship to software piracy. It was further found in a study conducted on students allowing other students to make illegal copies, that the problem of software piracy is not perceived as an ethical problem but as a result of the individual's evaluation of a cost benefit relationship and fairness (Glass and Wood 1996).

2.5.2 *It doesn't harm anyone*

Software piracy has flourished due to the very nature and characteristics of the software. Whilst the software is initially very expensive to produce (R&D investment), its reproduction and subsequent distribution cost is minimal.

Moreover the software has the distinctive characteristics of that of a public good – in that sharing the software with others does not reduce the consumption utility of the product (Ram and Sanders 2000). These very characteristics have facilitated their illegal distribution worldwide. The advent of the Internet and broadband has amplified the problem.

2.5.3 *The risk of being caught is minimal*

Censure refers to the perceived threat of punishment that accompanies the buying of pirated software (Trevor and Gurpreet 2000). The illegality of software piracy is the focus of the suggestion that to buy or not to buy pirated software is an ethical judgment (Koen and Im 1997). Indeed, the SIIA's principal means of attacking the software pirate is to increase the actual and perceived censure associated with the act, through intellectual property rights legislation, adequate enforcement of those laws, and education of the public about the nature of intellectual property rights (Trevor and Gurpreet 2000).

In Peace (1997) as quoted by Husted (2000) it was demonstrated that punishment was a deterrent for software piracy provided the probability of such punishment was real.

Driven by a need to use the software, the software pirate may be willing to risk censure and seek out pirated software in order to satisfy the need (Trevor and Gurpreet 2000).

Whilst it is acknowledged that software piracy does occur, it should be observed that there is still a large volume of individuals that persist to purchase software despite the relative ease of copying it (Conner and Rumelt 1991). The cost of piracy is not negligible with the expected cost of penalties and loss of reputation if caught.

In South Africa the Copyright Law of 1978 is deficient in that there is a lack of criminal penalties for end user piracy. South African law currently provides that the sale of infringing software is a criminal offence, but there is no criminal penalty in the end user context (Microsoft 2003). In addition the South African

law permits infringing end users to pay damages that are less than the infringer would have paid, had he/she bought licensed software (Microsoft 2003).

2.5.4 *Summary of the third sub-problem literature review*

The widely accepted and social non-censure together with minimal legal ramifications is likely to contribute to software piracy.

2.6 Conclusion of Literature Review

The impact of demographics and profiling of users on ethical behaviour appears to be an important area for future research (Simpson et al. 1994). In addition, situational and personal variables should be identified and examined for their impact on software piracy behaviour. Cheng et al.'s (1997) study represented an attempt to identify underlying reasons/motivations for people to pirate software but indicated that future studies should expand to take into account demographics and other variables particularly software prices.

2.6.1 *Proposition 1:*

It is possible to demographically profile/model individuals likely to pirate software based on the following: gender, age, level of education, work experience, frequency of computer use and religious commitment.

2.6.2 *Proposition 2:*

There are a number of stimuli (motivating factors) inherent in software products that lend itself to piracy including tangibility and non-exclusivity; ease of copying; quality; accessibility due to being readily available and cost.

2.6.3 *Proposition 3:*

The widely accepted and social non-censure together with minimal legal ramifications is likely to contribute to software piracy.

CHAPTER 3: RESEARCH METHODOLOGY

This research attempts to develop a profile of individual computer users who illegally copy software. In addition the research attempts to determine the individual reasons and attitude toward the unauthorised copying of computer software.

3.1 Research methodology

Some researchers attribute the widespread incidence of software piracy to people's attitudes toward piracy, behaviour and peer norms (Cheng et al. 1997). However, current literature leaves unanswered the questions of why individuals pirate software in South Africa and what is the profile of such a user. This study attempts to marry the demographics of an individual as well as determine the factors motivating such an individual. A quantitative research approach was used in this study.

3.1.1 *Quantitative Research*

Quantitative research is used to determine relationships among measured variables with the purpose of explaining, predicting and controlling phenomena (Leedy and Ormrod 2005). In search of "truth," quantitative researchers emphasize standard measures, replicable findings, comparison to accepted standards, minimization of bias and successful prediction (Inu 1996).

Quantitative research has been employed by several authors on similar studies including Mikko and Tero (2007), Villazon (2004) and Simpson et al. (1994).

3.2 Research Design

Using the literature review, a questionnaire was administered, which was used to capture the demographics of individuals to assist with the profiling of a software pirate as well as determining the motivating factors to illegally copy software.

To identify the profile of individuals who pirate software, business students, IT professionals and knowledge workers were chosen as subjects of the study. Recent research suggests that software piracy is more prevalent in academia than in business (Sims et al. 1996). Furthermore the problem of piracy begins before business students become practising managers (Oz 1990). Whilst much research has focussed on students (Mikko and Tero 2007; Sims et al. 1996), the current research extends to IT professionals and knowledge workers.

The questionnaire is based on previously validated instruments and measures. The questionnaire is designed to assess demographic characteristics, past pirating behaviour and potential motivating factors for pirating software.

An anonymous questionnaire was preferred over open interviews. Similar studies have concluded that open interviews are seen as an unreliable method of studying the question of piracy due to its sensitivity (Mikko and Tero 2007).

The research instrument in this study uses a Likert-like scale. A Likert-like scale is used to determine the relative intensity of different items (Villazon 2004).

Respondents were required to indicate how they will meet certain situational challenges that could lead to piracy in order to assess their propensity to pirate. In a study by Sims et al. (1996), it was found that asking respondents directly about their behaviour concerning piracy, resulted in concealment of their behaviour. Hence the respondent was asked to express a confidence level in their propensity to carry out acts of piracy. In addition, to assess the potential to pirate the respondents are asked directly if he/she or any of peer group has pirated software or been party to software piracy in the past.

Based on the literature review and discussions with colleagues and computer professionals a list of potential motivating factors, together with social and legal perceptions for pirating software was identified. Respondents needed to rate these reasons on a scale of 1 to 5, according to how strong they feel the motivating factor is.

Data from the questionnaires was analysed using distribution fitting algorithm in order to determine the top ranking motivating factors for software piracy. Descriptive statistics using cross-tabulation was used to determine significant demographic factors influencing software piracy.

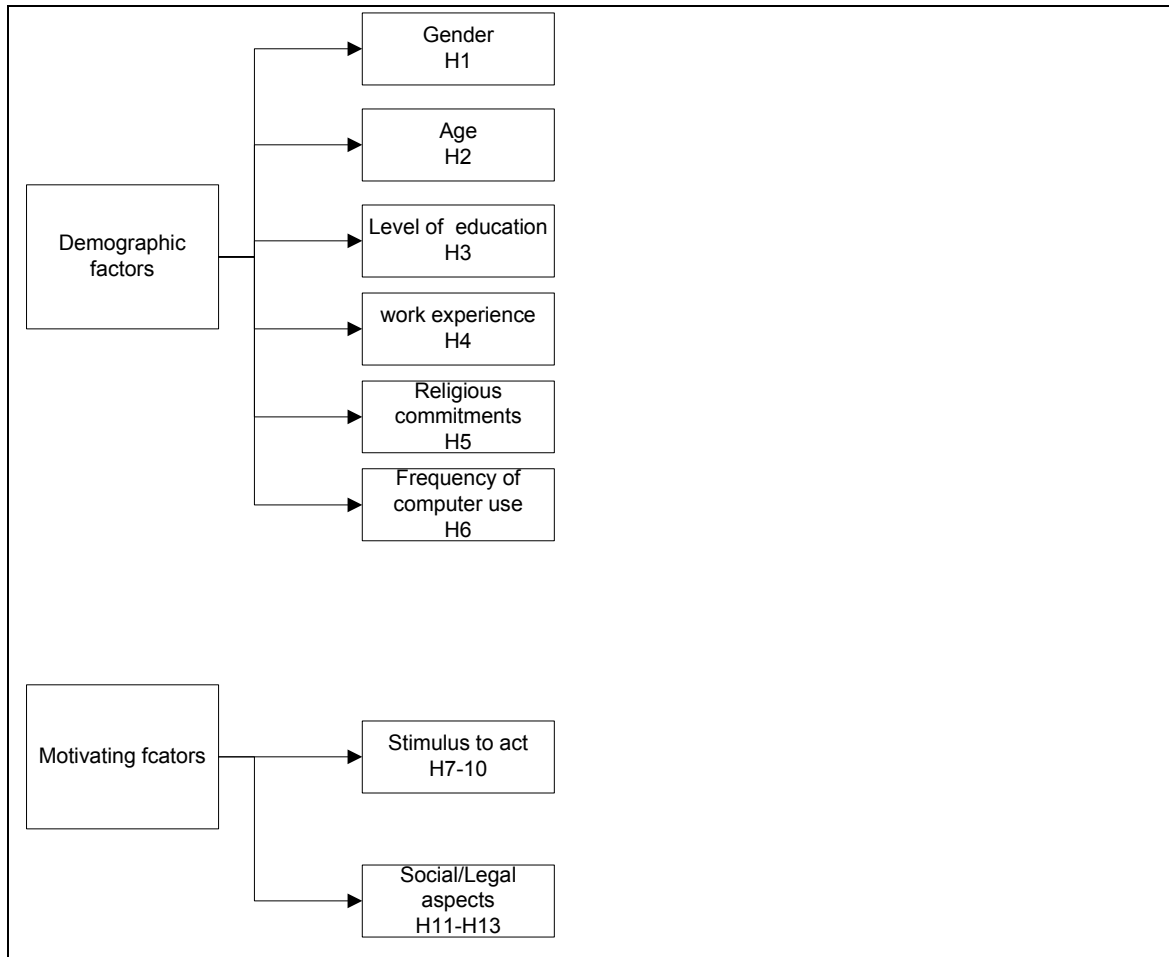


Figure 3. Structure of the questionnaire

Figure 3 outlines the structure of the questionnaire. To test the propositions proposed in the previous section, respondents were required to indicate their gender, age, level of education, computer experience, work experience and religious commitment.

The main challenge encountered regarding this approach was to ensure that responses were honest. Given the sensitivity of the questions, complete anonymity was assured in order to overcome this.

The methodology allowed for quick responses at little or no cost.

3.3 Population and sample

3.3.1 *Population*

This research was based on individual computer users. Institutions and corporations were excluded from this study.

3.3.2 *Sample and sampling method*

- ***Sample size***

An adequate sample size enables the detailed exploration and understanding of the research study (Ritchie, Lewis and Elam 2003). A variety of rules have been suggested in determining the sample size (Guadagnoli and Velicer 1988). Guadagnoli and Velicer (1988) suggest that the sample size be determined as a function of the number of variables. It is suggested that the sample should be at least five times the number of variables. Another approach is to use the same sample size used in similar studies (Israel 1992). In Villazon (2004), a sample size of 150 was used.

Based on the above, a mixed sample of IT professionals; knowledge workers and business students was selected, with a sample size of 300 and a response rate of 236 (50 more responses than the minimum sample size required – 37 variables x 5).

Table 1: List of respondents

Position of individual	Source of Respondents
• Business school students	University of the Witwatersrand
• IT professionals	Network of colleagues
• Knowledge workers	Network of colleagues

Table 1 represents the three key groups relevant to software piracy. This study attempts to profile a software pirate based on the responses from these groups.

- ***Sampling Method***

A purposive sampling method was used in order to capture the data from the three groups noted in Table 1. Visits to the Wits Business School enabled the selection of business students, whilst knowledge workers and IT professionals were targeted by friends and colleagues in their relevant work environments.

3.4 The research instrument

The research instrument used in this study is a questionnaire divided into 5 sections. The questionnaire was designed to assess demographic characteristics, past software piracy behaviour and potential motivating factors for pirating. A 5-point Likert scale was used to gather the necessary information. The questions noted in the questionnaire were derived from the literature review as well as questions from similar studies such as Villazon (1994) and Simpson et al. (1994).

The five sections of the questionnaire are detailed below:

Section 1 - Demographic questions

Section 2 – Religious commitment

Section 3 – Propensity to software piracy

Section 4 – Disclosure of software piracy acts

Section 5 – Ranking of motivating factors influencing software piracy

Section 1 captured data about the individual computer user specific to age, gender, education level and years of work and computer experience. This together with the indication of whether the individual is an IT professional, knowledge worker or business student was used to profile the individual.

Section 2 captured the level of religious commitment. As religion is closely associated with moral attitude as cited by Villazon (2004) and Logsdon et al.

(1994), the study attempts to determine if moral attitude is correlated with piracy. The Likert scale used for this section is as follows:

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

Section 3 captured individuals' attitudes toward software piracy based on certain motivating criteria such as software is too expensive, time limitations to purchase the software, "no one will know" if one pirates; and "everyone else does it". This section was framed in a diplomatic manner to suss out the propensity for individuals to pirate based on the certain motivating factors mentioned above. The Likert scale used for this section is as follows:

1. Not confident
2. Somewhat confident
3. Average
4. Very confident
5. Extremely confident

Section 4 directly requires the disclosure of software piracy acts. Under anonymity, truthful answers were expected. The questions posed required "yes/no" answers.

Section 5 requested the respondents to rate the motivating factors influencing software piracy from most significant to least significant. Fifteen (15) potential motivating factors for software piracy were identified through the literature review and respondents were asked to rate each factor.

Table 2: List of motivating factors

Motivating factors	Source
I need it for my work	Cheng et al. (1994)
I need it for my education	Sims et al. (1996)
Software is too expensive	Cheng et al. (1994)
Challenge excites me	Eining and Christensen (1991)
I can make money	Odier (1987) cited in Sims et al. (1996)
Don't know where to buy it	Simpson et al. (1994)
Long lag time to buy and get	Simpson et al. (1994)
No time to buy	Simpson et al. (1994)
Easy to copy	Langford (1995)
Quality is bad	Takeyama (2003)
Cannot be bound by ownership	Mikko and Tero (2007)
It does not harm anyone	Highland (1983)
Risk of getting caught is minimal	Logsdon et al. (1994)
Everyone else does it	Langford (1995)
I enjoy sharing with others	Simpson et al. (1994)

Table 2 indicates the list of motivating factors used in section 5 and the various sources of study that identified these motivating factors as possible reasons for software piracy.

The Likert scale used for this section is as follows:

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

The sample questionnaire was tested amongst colleagues to ensure that the questionnaire was easily understood and the questions were posed unambiguously. Their recommendations were incorporated into the questionnaire.

3.5 Procedure for data collection

The following details the procedures that were used for data collection:

- Business School students - The questionnaire was handed out to 4 different classes of Wits Business School students stressing the anonymity of the respondents
- IT professionals – The questionnaire was emailed to friends and colleagues who then forwarded it on to other IT contacts utilising the IT network of professionals. Hard copy printouts were returned
- Knowledge workers – hard copies of the questionnaire were handed out to work colleagues, friends and family to network respondents. The questionnaires were explained and a central repository indicated for the hand-in of completed questionnaires.

The main issues arising from the distribution of the questionnaires are indicated below:

- Ability to ensure that the individuals in the group are sufficiently diversified as the questionnaires will be handed out through a network of friends and colleagues and;
- Collecting the questionnaires from the respondents.

To overcome the abovementioned issues, the questionnaires were handed to colleagues that have access to wider communities of computer users ensuring the diversity of respondents. In addition, these colleagues were subjected to regular follow-ups for questionnaire completion.

3.6 Data analysis and interpretation

The data obtained from the questionnaire was analysed using a number of statistical techniques as appropriate for each proposition:

3.6.1 **Proposition 1**

It is possible to demographically profile/model individuals likely to pirate software based on the following: gender, age, level of education, work experience, frequency of computer use and religious commitment.

Proposition 1 was analysed using descriptive statistics with cross-tabulation. Descriptive statistics is used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures.

Cross-tabulation analysis, also known as contingency table analysis is most often used to analyse categorical (nominal measurement scale) data. Cross-tabulations are appropriate for Categorical (Ordinal) Data such as multiple choice questions. A cross-tabulation is a two (or more) dimensional table that records the number (frequency) of respondents that have the specific characteristics described in the cells of the table. Cross-tabulation analysis is useful for showing how respondents answered on two or more questions at the same time and understand how the two different survey items inter-relate. In addition it shows a distribution between two variables and is usually presented as a matrix in the form of a table. Cross-tabulation analysis is easy to understand and draw quick conclusions with the tables providing greater insight than single statistics particularly with Chi-Square Analysis.

The Chi-square statistic is the primary statistic used for computing the statistical significance of the cross-tabulation table. Chi-square is used to test for statistical independence; that is, to see if the two variables are independent. If the variables are independent (have no relationship), then the results of the statistical test will be “non-significant” and we “are not able to reject the null hypothesis,” meaning that we believe there is no relationship between the variables. If the variables are found to be related, then the results of the statistical test will be “significant” and we “are able to reject the null hypothesis”, meaning that we can state that there is some relationship between the variables. We use the chi-square statistic as the means of testing, or determining if the relationship is “statistically significant”.

The chi-square statistic, along with the associated probability of chance observation, may be computed for any table. If the variables are related (i.e., the observed table relationships would occur with very low probability, say only 5%) then we say that the results are “statistically significant” at the “.05 or 5% level”. This means that the variables have a low chance of being independent.

Descriptive statistics is used to determine the significance of the demographic variables of age, gender, frequency use of computers, work experience, level of education and religious commitment to software piracy as reflected in the variable determining past piracy behaviour.

This model was used by Solomon and O'Brien (1990) and Taylor and Shim (1993).

The demographic factor of religious commitment was analysed using a distribution fitting algorithm with a two sample T-test. The t-test assesses whether the means of two groups are *statistically* different from each other. This analysis is appropriate whenever you want to compare the means of two groups. When we look at the differences between scores for two groups, we have to judge the difference between their means relative to the spread or variability of their scores. The t-test does this.

The two sample t-test for unpaired data is defined as:

$$H_0: \mu_1 = \mu_2$$

$$H_a: \mu_1 \neq \mu_2$$

Test Statistic:

$$T = \frac{\bar{Y}_1 - \bar{Y}_2}{\sqrt{s_1^2/N_1 + s_2^2/N_2}}$$

where N_1 and N_2 are the sample sizes, $\bar{Y}_1$ and $\bar{Y}_2$ are the sample means, and s_1^2 and s_2^2 are the sample variances.

Significance α . Level: 0.05

Critical Reject the null hypothesis that the two means are equal if

Region:

$$T < -t_{(\alpha/2, \nu)}$$

or $T > t_{(\alpha/2, \nu)}$

Where $t_{(\alpha/2, \nu)}$ is the [critical value](#) of the [t distribution](#)

With ν degrees of freedom where $\nu = (N1+N2)-2$

3.6.2 Proposition 2 and 3

There are a number of stimuli (motivating factors) inherent in software products that lend itself to piracy including tangibility and non exclusivity; ease of copying; accessibility due to being readily available and cost.

The widely accepted and social non-censure together with minimal legal ramifications is likely to contribute to software piracy.

To analyse propositions 2 and 3, a distribution fitting algorithm is used. A common application where distribution fitting procedures are useful is in verifying the assumption of normality before using any parametric test. Stacey (2005) proposes an algorithmic involving the fitting of distributions to the observed survey *data* using the χ^2 statistic.

This methodology is more reliable and valid than other alternative approaches, as demonstrated in a study by Stacey (2005). The methodology assumes (and can test for) normal distributions.

Based on the distribution fitting algorithm, the motivating factors were ranked in order of their mean values and significance.

3.7 Limitations of the study

The first limitation of this study is that it will concentrate solely on software piracy and hence its results cannot be generalised to other communication media such as music, movies etc.

A further limitation of this study is that the study determines behavioural intention to pirate software and is not an actual measure of pirating behaviour (Gopal and Sanders 1997).

This study is exploratory in nature and lacks the statistical rigours found in most confirmatory types of research. Purposive sampling was used limiting the generalisations to the whole of the population of computer users. In addition simple descriptive statistics was used in the analysis.

3.8 Validity and reliability

The use of reliability and validity are important in research (Moss 1994). Reliability is the extent to which results are consistent over time and is an accurate representation of the total population under study. If the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable (Golafshani 2003).

Validity in quantitative research determines whether the research truly measures that which it was intended to measure or how truthful the research results are (Golafshani 2003).

Holland, Thayer, Wainer and Braun (1988) described the validity in quantitative research as “construct validity”. The construct is the initial concept, notion, question or hypothesis that determines which data is to be gathered and how it is to be gathered (Holland et al. 1988).

Hence the definitions of reliability and validity in quantitative research consist of two elements:

Firstly, with regards to reliability, whether the result is replicable.

Secondly, with regards to validity, whether the means of measurement are accurate and whether they are actually measuring what they intended to measure (Golafshani 2003).

The research was undertaken through a validated questionnaire which is short and unambiguous. The questionnaire was initially distributed amongst co-

workers to determine the reliability of the questionnaire and avoid misinterpretation.

3.8.1 External validity

External validity examines whether an observed causal relationship can be generalised across different measures, persons, settings or time beyond the study itself (Calder, Phillips and Tybout 1982)

The questionnaire is designed based on validated instruments previously used to measure attitudes, motivational factors and religious commitment.

Factors that may influence external validity:

- The sample is not randomly chosen but will be selected purposely and conveniently. Individual respondents will be selected on a networking basis. To increase validity a wide distribution network of individuals will be used with each individual responsible for only five returned questionnaires.
- The sample will be chosen from groups assumed to be representing diverse groups of computer users.

To ensure external validity the questionnaire will be confidential and anonymous. The questionnaire strongly emphasises the anonymity of the respondent to ensure that the respondent feels secure in answering openly and honestly.

3.8.2 Internal validity

Internal validity refers to the success in countering threats to validity that lie within a particular research (Hammersley 1991) and relates specifically to the extent that the researcher is able to draw conclusions on that which the research is intended to measure (Grimes and Schultz 2002).

The questionnaire was designed using literature review and validated instruments. However it is anticipated that a response bias may well occur within the study. Villazon (2004), described the response bias as being

influenced by socially desirable responding, where the answers by the respondent are made to look good. Cheng et al. (1997) also indicated that respondent fatigue and reticence about self reporting unethical behaviour may well impact validity.

The study has not addressed these factors although it is stressed in the instrument that participation is completely voluntary. In addition the respondents will be informed that their responses will be kept anonymous and will not be used, other than within this study.

3.8.3 *Reliability*

The tendency towards consistency found in repeated measurements of the same phenomena is referred to as reliability (Moss 1994). The more consistent the results, the higher the reliability (Moss 1994).

Reliability is not an indicator of validity (Moss 1994) and whilst it is necessary it is not a sufficient condition for validity (Leedy and Ormrod 2005)

A validated instrument is used to gather data on the demographics and motivating factors. The motivating factors listed in the instrument were reviewed for comprehensiveness and is supported by the literature review. The questionnaire is short and unambiguous.

CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

This chapter reports the characteristics of the sampled population, illustrates and assesses the variables measured and reports the statistical results for each of the propositions.

A total of 236 responses were received exceeding the minimum sample required of 185. All responses were used in the analysis despite some respondents not fully responding to all 37 questions. Nineteen (19, 8%) respondents did not fully complete all the questions. The number of missing values is noted in each of the analysis.

4.2 Demographic profile of respondents

4.2.1 *Occupation*

Table 3: Respondents per occupation category

Occupation	Number of respondents	%
Business student	62	26%
IT professional	87	37%
Knowledge/Information worker	85	36%
Missing info	2	1%

Table 3 indicates the number of respondents per category of individual computer users. The respondents represent a fair distribution across all three categories with knowledge/information workers and IT professionals constituting 36% and 37% respectively of the total sample. This was expected given the diversity of roles that fall within this category.

4.2.2 *Gender*

Table 4: Respondents by gender

Gender	Number of respondents	%
Male	104	44%
Female	123	52%
Missing info	9	4%

Table 4 indicates the number of respondents per gender category of individual computer users with 52% being female. The two gender groups are well represented in this study.

4.2.3 Age group

Table 5: Respondents by age

Age Groups	Number of respondents	%
18-24	18	8%
25-35	108	46%
35-45	87	37%
45-55	14	6%
55+	6	3%
Missing info	3	1%

Table 5 indicates the number of respondents per age group category of individual computer users. A total of 83% of the respondents are between the ages of 25-45. This is expected given that the purposive sample included business students. The recent developments and proliferation of personal computers in the last 25 years supports the dominant age spread of the sample.

4.2.4 Education level

Table 6: Respondents by education level

Education Level	Number of respondents	%
Grade 12	23	10%
Undergraduate	50	21%
Postgraduate	109	46%
Masters	44	19%
Doctoral	1	0%
Missing info	9	4%

Table 6 indicates the number of respondents based on education level. A large majority of the sample (86%) received tertiary education with 46% of the

respondents being postgraduates. This is expected given that business students and IT professionals were part of the purposive sample.

4.2.5 Work Experience

Table 7: Respondents by number of years work experience

Work Experience	Number of respondents	%
1-3	26	11%
3-5	39	17%
5-8	31	13%
8-10	25	11%
10+	110	47%
Missing info	5	2%

Table 7 indicates the number of respondents based on work experience. 47% of the respondents have 10+ years of work experience.

4.2.6 Computer Experience

Table 8: Respondents by number of years of computer experience

Computer experience	Number of respondents	%
Novice	2	1%
Basic User	39	17%
Intermediate	77	33%
Advance	94	40%
Expert	18	8%
Missing info	6	3%

Table 8 indicates the number of respondents based on computer literacy as determined by number of years of computer experience. 40% of the respondents are advanced computer users.

4.3 Results pertaining to Proposition 1

It is possible to demographically profile/model individuals likely to pirate software based on the following: gender, age, level of education, work experience, frequency of computer use and religious commitment.

Section 1 of the questionnaire requested respondents to provide individual data regarding occupation, gender, age, education level, work experience and computer experience whilst section 2 requested an assessment of their religious commitment. This data, using descriptive statistics, was cross-tabulated with question 20 “have you ever made unauthorised copies of computer software”.

Table 9: Descriptive statistics of demographic features

	Occupation	Gender	Age	Education level	Work experience	Computer experience
Chi-Square Statistics Section						
Chi-Square	14.38	19.88	9.66	4.31	6.82	9.84
Degrees of Freedom	2.00	1.00	4.00	4.00	4.00	4.00
Probability Level	0.00	0.00	0.05	0.37	0.15	0.04
	Reject Ho	Reject Ho	Reject Ho	Accept Ho	Accept Ho	Reject Ho

Table 9 indicates a high chi-square for occupation, gender, age and computer experience and a low chi-square for education level and work experience. The high chi-square for occupation, gender, age and computer experience indicates statistical significance.

Further analysis was performed on the demographic variables with high chi-square scores. The analysis reviewed the mean response to past piracy behaviour for each demographic variable.

Table 10: Occupation vs piracy response

	# respondents	sum of responses	mean response
Business student	62	90	1.451612903
IT professional	87	130	1.494252874
Knowledge worker	85	147	1.729411765

Table 10 indicates the three groups of respondents were summed with their individual responses to question 20 –“have you ever made unauthorised copies of computer software” with a response scale of 1 for “Yes” and 2 for “No”. As predicted the mean response rate of business students is the lowest between the three groups indicating a greater frequency of software piracy occurs amongst business students. The difference between these response rates is statistically significant (chi-square =14.38; $p < 0.000754$; $df = 2$).

Table 11: Gender vs piracy response

	# respondents	sum of responses	mean response
Male	104	147	1.413461538
Female	123	210	1.707317073

Table 11 indicates the two groups of respondents were summed with their individual responses to question 20 –“have you ever made unauthorised copies of computer software” with a response scale of 1 for “Yes” and 2 for “No”. As predicted the mean response rate of males is the lowest between the two groups indicating a greater frequency of software piracy occurs amongst males. The difference between these response rates is statistically significant (chi-square =19.88; $p < 0.000008$; $df=1$). This is in line with the findings from Solomon and O’Brien (1990) wherein it was found that females engage in less piracy.

Table 12: Age vs piracy response

	# respondents	sum of responses	mean response
18-24	18	23	1.277777778
25-35	108	168	1.555555556
35-45	87	140	1.609195402
45-55	14	25	1.785714286
+55	6	9	1.5

Table 12 indicates the five groups of respondents were summed with their individual responses to question 20 –“have you ever made unauthorised copies of computer software” with a response scale of 1 for “Yes” and 2 for “No”. As predicted the mean response rate of the younger age group 18-24 is the lowest between the groups indicating a greater frequency of software piracy occurs amongst this age group. The difference between these response rates is statistically significant (chi-square =9.66; $p < 0.046635$; $df=4$). This is in line with the findings from Solomon and O’Brien (1990) wherein younger students pirate more software.

Table 13: Computer experience vs piracy response

	# respondents	sum of responses	mean response
Novice	2	3	1.5

	# respondents	sum of responses	mean response
Basic User	39	67	1.717948718
Intermediate	77	120	1.558441558
Advance	94	148	1.574468085
Expert	18	23	1.277777778

Table 13 indicates the five groups of respondents were summed with their individual responses to question 20 –“have you ever made unauthorised copies of computer software” with a response scale of 1 for “Yes” and 2 for “No”. As predicted the mean response rate of the expert computer users is the lowest between the groups indicating a greater frequency of software piracy occurs amongst this group. The difference between these response rates is statistically significant (chi-square =9.84; $p < 0.043189$; $df=4$)

Religious commitment vs software piracy

The four questions to ascertain religious commitment as an influential factor on software piracy was based on a 5-point Likert scale where 1 was attributed to strongly disagree and 5 for strongly agree. This was tabulated as per below:

Table 14: Religious commitment vs piracy response

	YES to Qu.20				NO to Qu.20			
	B7	B8	B9	B10	B7	B8	B9	B10
Observed								
Strongly disagree	5	5	5	3	7	8	6	6
Disagree	4	5	8	11	9	8	6	10
Neither	33	25	14	23	30	17	17	15
Agree	41	32	46	41	43	40	52	57
Strongly agree	16	32	26	20	43	59	51	44
	99	99	99	98	132	132	132	132

Table 14 indicates the responses to the four questions (on religious commitment) posed under section 3 of the questionnaire as related to past piracy behaviour.

A distribution fitting algorithm was applied to the responses which was then tested for significance via a two sample t-test using NCSS. Reports in Appendix B.

Ho: There is no statistically significant difference between the mean religious commitment of the individuals that pirate and the mean religious commitment of those that do not pirate, $\mu_1 = \mu_2$.

Ha: There is a statistically significant difference between the mean religious commitment of the individuals that pirate and the mean religious commitment of those that do not pirate $\mu_1 \neq \mu_2$

Calculation of the two sample T-test was performed using NCSS with the critical value of t referenced in the t-distribution tables.

Degrees of freedom (df) = (n1+n2)-2 df = 99+132-2=229

Level of confidence (alpha) – 0.5/2=0.025

The t-distribution table to determine the critical value = 1.960

Table 15: Two sample T-tests results

		two-tailed		
	Df	$\alpha/2$	T value	t-value
Enjoy reading about my religion	229	0.025	-2.504	1.96
I spend time in prayer	229	0.025	-2.295	1.96
Strong sense of spiritual presence	229	0.025	-2.065	1.96
Try hard to live by my religious beliefs	228	0.025	-2.448	1.96

Table 15 indicates that the test statistic on all four questions does not meet or exceed the critical value of 1.960 for a 2-tailed test indicating that there is no statistically significant difference between the mean religious commitment of the individuals that pirate and the mean religious commitment of those that do not pirate.

4.4 Results pertaining to Proposition 2 and 3

There are a number of stimuli (motivating factors) inherent in software products that lend itself to piracy including tangibility and non-exclusivity; ease of copying; accessibility due to being readily available and cost.

The widely accepted and social non-censure together with minimal legal ramifications is likely to contribute to software piracy.

Table 16: Behaviour patterns toward software piracy

	Responses				Responses		
	Yes	No	Missing	Mean	Yes	No	Missing
Copied Software	101	134	1	1.57	43%	57%	0%
Asked to allow copying by others	114	121	1	1.51	48%	51%	0%
Offered to copy by others	155	76	5	1.39	66%	32%	2%
Average mean				1.49			

Table 16 summarises the responses to the direct question pertaining to past software piracy acts. The above findings are in line with piracy rate in South Africa of 36% as reported in the fourth annual BSA and IDC Global Software Piracy Study (May 2006).

In analysing attitudes toward software piracy based on certain motivating criteria the mean response was calculated for each item based on a rating scale with 1 for “Strongly agree”; 2 for “Agree”; 3 for “Neutral”; 4 for “Disagree” and 5 for “Strongly disagree”. The mean values for each item was then ranked in ascending order with the lowest score indicating strong agreement.

Table 17: Ranking of attitudes to software piracy factors

Rank	Mean	Stimulus to act with socio cultural factors	Factor category
1	2.78	dissuade a friend from piracy	Socio legal factors
2	2.93	too expensive	Motivating factor: stimuli
3	3.00	seen others do it	Socio legal factors
4	3.05	opportunity to pirate -no one will know	Motivating factor: stimuli
5	3.07	help a friend in need	Socio legal factors
6	3.07	no time to buy	Motivating factor: stimuli
7	3.09	for work/education	Motivating factor: stimuli
8	3.10	want what your friend has	Motivating factor: stimuli
9	3.32	get a copy for a friend	Socio legal factors

Table 17 indicates the ranking of attitudes towards software piracy with the top motivating factor or stimulus to act being the cost of software and having the opportunity to copy without anyone knowing.

In section 5 respondents were asked to rate the motivating factors influencing software piracy from most significant to least significant. Fifteen (15) potential motivating factors for software piracy were identified and respondents were asked to rate each factor. Based on the distribution fitting algorithm, the mean values of each motivating factor that had a “yes” response to software piracy was ranked.

Table 18: Ranked motivating factors for software piracy

Description	Mean	Ranked	Factor category
The software is too expensive	0.705	1	Motivating factor: stimuli
It is easy to copy software	0.397	2	Motivating factor: stimuli
I need the software for my education	0.393	3	Motivating factor: stimuli
I need the software for my work	0.136	4	Motivating factor: stimuli
Everyone else does it	0.066	5	Socio legal factors
The risk of getting caught is minimal	-0.2	6	Socio legal factors
I enjoy sharing software with others	-0.23	7	Socio legal factors
The quality of software is so bad	-0.36	8	Motivating factor: stimuli
There is a long lag time between ordering and receipting	-0.48	9	Motivating factor: stimuli
I do not have the time to make the purchase	-0.48	10	Motivating factor: stimuli
It does not harm anyone	-0.5	11	Socio legal factors
Software cannot be bound by ownership	-0.55	12	Socio legal factors
The challenge excites me	-0.59	13	Motivating factor: stimuli
I do not know where or how to purchase it	-0.67	14	Motivating factor: stimuli
I can make money with it	-1.23	15	Motivating factor: stimuli

Table 18 indicates the ranking with the top three motivating factors being: software is too expensive, it is easy to copy software; and I need the software for my education.

Based on both attitudes towards software piracy and motivating factors, the main reason for software piracy is the cost followed by the ease of copying and purpose of use.

4.5. Summary of the results

4.5.1 *Proposition 1*

Descriptive statistics using cross-tabulation was used to determine the demographic profile of a software pirate together with a two sample T-test to determine if religious commitment was a distinguishing factor in software piracy acts. Based on the chi-square analysis, the demographic factors of occupation, gender, age and computer experience are significant factors influencing software piracy. However, the two sample T-test indicated that there is no statistically significant difference between the mean religious commitment of the individuals that pirate and the mean religious commitment of those that do not pirate.

4.5.2 *Proposition 2 and 3*

Distribution fitting algorithm was used to determine the motivating factors for software piracy. The motivating factors are categorised as stimuli to act and socio legal factors. The top ranked motivating factor is cost. The top ranked socio legal factor influencing piracy is that everyone does it.

In terms of attitude the top ranked attitude is the reluctance to dissuade peers, family or friends from copying software.

CHAPTER 5: DISCUSSION OF THE RESULTS

5.1 Introduction

The primary objective of this research study was to assess the demographic characteristics, past software piracy behaviour and potential motivating factors for pirating software. This chapter presents a discussion of the results of the research study undertaken as described in chapter 4. The research results are explored and contextualised. The research findings are compared to the literature review.

5.2 Demographic profile of respondents

The respondents were requested to indicate demographic features applicable to themselves in the following areas:

Occupation: An equal number of respondents were expected across the occupation categories due to purposive sampling. However due to the convenient distribution of the questionnaire, a lower number of business students were surveyed as the survey was conducted during the October/November timeframe when most students were engaged in examinations. 26% of respondents were business students whilst IT professionals and knowledge workers accounted for 37% and 36% respectively.

Gender: 52% of the respondents of individual computer users are female. The two gender groups are well represented in this study and in line with the general population distribution as reported in Statistics SA Mid-year population estimates 2008.

Age: 83% of the respondents are between the ages of 25-45. The recent developments and proliferation of personal computers in the last 25 years supports the dominant age spread of the sample.

Education Level: 86% of respondents received tertiary education with 46% of the respondents being postgraduates. This is expected given that the business

students surveyed were part of the MBA course and that IT professionals were part of the purposive sample.

Work and computer experience: 47% of the respondents have 10+ years of work experience with 40% of the respondents noted as advanced computer users.

5.3 Discussion pertaining Proposition 1

It is possible to demographically profile/model individuals likely to pirate software based on the following: gender, age, level of education, work experience, frequency of computer use and religious commitment.

Analysis of the demographic features of occupation, gender, age, education level, work experience and computer experience using descriptive statistics, cross-tabulated with question 20 “have you ever made unauthorised copies of computer software” indicated that the following demographics were significant in profiling a software pirate based on their high chi-square scores and low p values:

- Occupation: The mean response rate of business students is the lowest between the three groups indicating that a greater frequency of software piracy occurs amongst business students. Pallette (1986) suggested that software piracy is more prevalent in academia than in business. Slater (1991) as cited by Sims et al. (1996), was the first study to examine students’ behaviour relative to computer based situations and found that more than 300 business students admitted to using computers unethically including hacking and illegal copying of software (Sims et al. 1996).
- Gender: The mean response rate of males is lowest between the two groups indicating a greater frequency of software piracy amongst males. Wong (1985) reported differences between male and females in the perpetration of computer crime. This was confirmed by Moores and Dhillon (2000) wherein the study confirmed the typical software pirate as

a male. Sims et al.'s (1996) study on demographic factors and unethical behaviour in general and on software piracy in particular found a significant difference between male and female in terms of the extent to which they pirate software. This however is contrary to the findings of Davis and Welton (1991) wherein no significant differences between male and female students and their ethical beliefs were found.

- Age: The mean response rate of the younger age group 18-24 is the lowest between the groups indicating a greater frequency of software piracy occurs amongst this age group. Highland's (1983) study supports the findings for what has become an accepted belief that younger individuals are more likely to commit software piracy (unethical behaviour) than older individuals. Solomon and O'Brien's (1990) study also found that younger students pirate more than older students.
- Computer experience: The mean response rate of the expert computer user is the lowest between the groups indicating a greater frequency of software piracy occurs amongst this group. Whilst Eining and Christensen (1991) found that expert computer users have a greater respect for the complexity around computer programs and hence may be willing to pay for them, Sims et al. (1996) found that those who used computers more often pirate across software types. Oz (2001) further suggests that information system professionals are more capable of duplicating and tapping into information technology resources and benefit from software piracy and hacking more so than any other profession.

Education level and work experience is not included as a factor in the make-up of a software pirate due to the low chi-square scores indicating no significant relationship. This is contrary to the study by Wee et al. (1995) and Kidwell et al. (1987). In Wee et al. (1995), it is stated that the higher the individuals' educational attainment, the more likely they are to purchase counterfeit software. Kidwell et al. (1987) found that those people who had been in the work force longer tended to behave in a more ethical manner. However, Logsdon et al. (1994) found relatively weak support for the number of years work experience being a factor in software piracy.

Religious commitment: The test statistic on all four questions did not indicate that there is a statistically significant difference between the mean religious commitments of the individuals that pirate and the mean religious commitment of those that do not pirate. This is contrary to Simpson et al. (1994), who in developing a model for potential determinants of software piracy, found that religion significantly influenced the propensity to pirate software.

Conclusion

Based on the findings of the study the profile of a software pirate is most likely to be a young male student that considers himself an expert computer user. Highland (1983), profiled a computer criminal as typically young, skilled and knowledgeable, believing that their use of the computer does not harm anyone.

Solomon and O'Brien's (1990) study indicated that it is the individual computer user who makes the ultimate decision on whether or not to pirate software.

5.4 Discussion pertaining to Proposition 2

There are a number of stimuli (motivating factors) inherent in software products that lend itself to piracy including tangibility and non-exclusivity, ease of copying, accessibility due to being readily available and cost.

The top 3 ranked motivating factors indicated by this research are:

Software is too expensive. This concurs with Oz's (1990) finding that students will copy software no matter what the cost. This is also consistent with Cheng et al.'s (1997) finding that software is too expensive being the top most important reason for pirating software. Harrington (1989) also found that higher cost lead to higher levels of copying.

It is easy to copy software. The ease of pirating software ranked 5th in the Cheng et al. (1997) study on Purchase or Pirate software.

I need the software for my education. This is in line with Solomon and O'Brien's (1990) study of the association between college major and illegal copies revealing that the illegal copying was a matter of necessity. In addition Oz

(2001) found a significant influence between college students and the propensity to pirate. This result is consistent with the demographic variable of business students significantly influencing the propensity to pirate software.

Personal gain factors (*I can make money with it and the challenge excites me*) as well as situational factors (*I do not know where to purchase and I do not have time to purchase*) was part of the lowest ranked reasons for software piracy. This is in line with the findings of Villazon (2004) although contrary to Simpson et al. (1994). Simpson et al.'s (1994) findings indicate that both personal gain and situational factors significantly influenced the propensity to pirate software.

5.5 Discussion pertaining to Proposition 3

The widely accepted and social non-censure together with minimal legal ramifications is likely to contribute to software piracy.

The three socio legal reasons from respondents that affirmed software piracy are: everyone else does it, the risk of getting caught is minimal and I enjoy sharing with others. Simpson et al. (1994) confirmed that “everybody does it” may be an influencing factor in pirating software.

In an analysis of attitudes and behaviour, it was found that respondents ranked the inability to dissuade piracy amongst peers, family and friends highest. In Villazon (2004) it was found that attitude towards software piracy is influenced by the behaviour perception of reference groups (i.e. friends and superiors).

5.6 Conclusion

Descriptive analysis with cross-tabulation supports and identifies several demographic variables as significant variables in affecting the propensity to pirate software. This includes occupation, age, gender and work experience.

In ranking the motivating factors, the most common motivating factor for the unauthorised copying of software was ‘software is too expensive’. This together

with the ease of copying and the purpose of use i.e. for education form the three main motivating factors. Personal gain factors and situational factors did not find significance in the study.

There is general acceptance of software piracy as noted by the significance of “everyone does it”. This together with the “risk of being caught is minimal” fuels the propensity for software piracy.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The purpose of this study was to attempt to develop a profile of a software pirate and determine the motivational factors underlying software piracy. This chapter summarises the key findings in context of the literature review. Implications of the key findings together with recommendations are presented to the stakeholders identified as beneficiaries of this study.

6.2 Conclusions of the study

6.2.1 *Profile of a software pirate*

In exploring the profile of a software pirate, the research pertaining to the following demographic characteristics found that occupation, gender, age and computer experience had a significant effect on software piracy.

This study found significant differences between male and females. As evidenced in table 11, males pirated software more often than females which is in line with other research on cheating behaviour as noted by Sims et al. (1996). Thus the gender of a software pirate can be identified as one demographic characteristic that can be used in profiling those who illegally copy software.

Secondly, this research also supports the contention that age is another characteristic which is useful in profiling the software pirate. Highland's (1983) study supports the findings for what has become an accepted belief that younger individuals are more likely to commit software piracy (unethical behaviour) than older individuals.

Thirdly, expert computer users are more likely to pirate software. This is another variable in profiling a software pirate.

Lastly and in line with the second variable of age, it was found that a greater frequency of software piracy occurs amongst business students. Pallette (1986) suggested that software piracy is more prevalent in academia than in business.

Educational level and work experience were not found to significantly impact the frequency to pirate. In addition despite several studies such as Simpson et al. (1994) and Wagner and Sanders (2001) finding a significant effect of religious commitment on software piracy, this research found no such significant relationship.

6.2.2 *Motivational factors influencing software piracy*

The most common rationale for unauthorised copying was “software is expensive”. Cheng et al. (1997) also found that this was the most important reason for software piracy. This reason together with the purpose of use being educational as the third ranked motivating factor indicated that respondents felt that the copying was justified for the purposes of study and maintaining professional skills. The ease of copying ranked as second in the list of motivating factors. This is in line with the study by Mikko and Tero (2007) wherein respondents claimed that copying is a handy and easy way to get software.

6.2.3 *Social non-censure and limited legal ramifications*

It is concerning to note that attitudes toward software piracy has not changed over the years. The three main socio legal factors noted for software piracy continues to be: ‘everyone does it’; ‘the risk of being caught is minimal’ and ‘I enjoy sharing with others’.

In Husted (2000), it was found that the problem of software piracy is often not perceived as an ethical problem, but as a result of the individual's evaluation of distributive fairness, comparing ratio of outcome to inputs.

In a survey of computer using professionals, it was determined that punishment was a deterrent for software piracy but it depended on their perception of the probability of such punishment (Husted 2000).

Similarly Whitman, Townsend, Hendrickson and Rensvold (1998) found that a group of students were more influenced by the consequences of their actions than by illegality of copying software.

In Harrington (1989), it was found that situational factors including high software cost, low likelihood of being caught, low level of punishment and perception of low impact on others all supported higher level of software copying.

In Glass and Wood (1996), it was found that there are a number of perceived positive outcomes for the person allowing the copying of software that he or she purchased. Such perceived positive outcomes are: a sense of altruism, possibility of cancelling a debt, and or instilling a new sense of indebtedness.

6.3 Recommendations

The study provides insights regarding the motivational factors that influence an individual's intention to commit software piracy. These insights suggest that certain policies may be adopted by organisations to inhibit software piracy.

Firstly, the results indicate that one of the main reasons for software piracy is that the software is perceived as being too expensive. In order to minimise this perception software should be bundled with textbooks and/or hardware. Alternatively, software vendors could allow a rebate based on volume of software sold advising software users that piracy leads to increased costs.

To further combat the notion of software is too expensive, software firms should allow for software to be accompanied by complimentary products such as support, manuals and training vouchers. This facilitates the learning and

personalising of the software with an added benefit to the buying customer. Furthermore, it can be stressed through anti-piracy campaigns that individuals who pirate software face additional costs owing to the lack of adequate documentation, technical support and sanctions if caught.

Secondly, as software piracy is prolific due to individuals perceiving low or no consequences related to this act, it is recommended that tough enforcement policies are developed as well as stringent penalties. Glass and Wood's (1996) study on determinants of software piracy found that negative outcomes do in fact reduce an individual's intentions to provide another person with software for illegal copying. In Husted (2000), it was suggested that the focus on the criminal nature of software piracy would have less impact and that anti-piracy campaigns would do better to demonstrate that piracy is a shameful practice that brings a loss of face to family, friends and business. Gopal and Sanders (1998) suggested dissuading individuals from piracy by educational campaigns that attempt to teach users about copyright laws and inspire attitude changes about software copying behaviour.

As long as the social consensus does not regard software piracy as evil or wrong, attitudes and behaviour towards software piracy will not change. The most effective anti-piracy campaign should stress the nature and magnitude of harm done to society that will result if the software industry cannot be protected from huge losses due to rampant software copying.

6.4 Suggestions for further research

This study concentrated on determining what the motivating factors for software piracy are and did not distinguish between the person who allows the copying and the person who copies the software. There is a close relationship between factors that affect both. As an example, cost is a motivating factor for both the provider and the recipient. Further study is required to identify the sensitivity to the motivating factors of those who commit software piracy.

Studies are required to determine how representative the sample in this study is for business people. Studies have found that business people are considerably more sensitive to the illegality and ethical wrongness of software piracy (Taylor and Shim 1993).

A further area for future research is to explore the type of software being pirated and the context in which such piracy is occurring. Despite the ease of copying unprotected programs, there is still a large legitimate market for these programs. It would be interesting to observe the concurrent existence of a large legitimate market and substantial piracy and the reason therefore.

Lastly, there seems to be a spin-off effect of piracy in that the installed base of the software programs increases creating an ecosystem around support and complimentary products. An area of further research could determine the net effect of direct sales losses versus software piracy's value enhancing effects. In Givon et al. (1995), it was demonstrated that 80% of the word processing and spreadsheet software purchased in the United Kingdom was the result of the influence of software pirates.

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Statistics SA Mid-year population estimates 2008

APPENDIX A: RESEARCH INSTRUMENT

Dear Survey Respondent

This survey forms part of a course requirement for a Master's degree at the University of the Witwatersrand Business School. The course requirement is to perform research in a business or commercial domain. The results from this survey are purely for academic purposes.

The sole purpose of this study is to identify which factors are likely to influence software piracy in South Africa. This questionnaire is directed at those people who are accustomed to computers and have had some experience with computers. Participation in the survey is voluntary and confidential. No personal contact information will be requested. All responses will be kept anonymous and will only be used as part of a group of responses input to the research project.

The five sections of the questionnaire are detailed below:

Section 1 - Demographic questions

Section 2 – Religious commitment

Section 3 – Propensity to software piracy

Section 4 – Disclosure of software piracy acts

Section 5 – Ranking of motivating factors influencing software piracy

The survey is quick and easy and requires the selected option to be circled.

Thank you for agreeing to complete this questionnaire. Your assistance is much appreciated.

Safeya Mahomed

MBA Student

University of the Witwatersrand

Section 1:						
The questions below are to provide background information. This questionnaire is completely anonymous. Please circle the appropriate option.						
1.	Occupation	Business student	IT professional		Knowledge/ Information worker	
2.	Gender	Male		Female		
3.	Age group in years	18-24	25-35	35-45	45-55	55+
4.	Education level	Grade 12	Undergrad	Postgraduate	Masters	Doctoral
5.	Years of paid work experience	1-3	3-5	5-8	8-10	10+
6.	Computer Experience	Novice	Basic user	Intermediate	Advance	Expert

Section 2: Please circle the most appropriate option (1) strongly disagree (5) Strongly agree. This questionnaire is completely anonymous		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7.	I enjoy reading about my religion	1	2	3	4	5
8.	It is important that I spend time in prayer	1	2	3	4	5
9.	I have a strong sense of a spiritual presence	1	2	3	4	5
10.	I try hard to live my life by my religious beliefs	1	2	3	4	5

Section 3: The following questions pertain to your use of software programs. Please circle the most appropriate option (1) not confident to (5) Extremely confident		Not confident	Somewhat confident	Average	Very Confident	Extremely confident
11.	When you badly need a software program but feel it is too expensive, how confident are you to refuse to use an illegal copy of that software	1	2	3	4	5
12.	When you badly need a software program but do not have the time to purchase a copy, how confident are you to refuse to use an illegal copy of that software	1	2	3	4	5
13.	When you badly need a software program and have the opportunity to obtain an illegal copy without anybody else knowing, how confident are you to refuse to use an illegal copy of that software	1	2	3	4	5
14.	When you badly need a software program and have seen other colleagues use an illegal copy, how confident are you to refuse to use an illegal copy of that software	1	2	3	4	5
15.	When you badly need a software program to benefit your work and/or education, how confident are you to refuse to use an illegal copy of that software	1	2	3	4	5
16.	If your colleague has a software program that you like very much, how confident are you not to ask for an illegal copy	1	2	3	4	5
17.	If a good friend badly needs a software program, how confident are you not to make an illegal copy for him/her	1	2	3	4	5
18.	If a good friend badly needs a software program and is asking for your help to obtain an illegal copy, how confident are you to refuse the request	1	2	3	4	5
19.	If you see a good friend and/or colleague attempting to make an illegal copy of a software program, how confident are you to try and talk to him/her about it	1	2	3	4	5

Section 4. This section deals with attitudes toward and experience with unauthorised copying of computer software programs.			
20.	Have you ever made unauthorised copies of computer software	Yes	No
21.	Has anyone ever asked you to allow them to copy software that you own	Yes	No
22.	Has anyone ever offered to provide you with unauthorised copies of computer software	Yes	No

Section 5: The following questions list motivating factors to copy software. Please rate the most appropriate option (1) strongly agree to (5) strongly disagree. This questionnaire is completely anonymous		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
23.	I need the software for my work	1	2	3	4	5
24.	I need the software for my education	1	2	3	4	5
25.	The software is too expensive	1	2	3	4	5
26.	The challenge excites me	1	2	3	4	5
27.	I can make money with it	1	2	3	4	5
28.	I do not know where or how to purchase it	1	2	3	4	5
29.	There is a long lag time between ordering and receipting	1	2	3	4	5
30.	I do not have the time to make the purchase	1	2	3	4	5
31.	It is easy to copy software	1	2	3	4	5
32.	The quality of software is so bad that it is not worth paying for	1	2	3	4	5
33.	Software cannot be bound by ownership or copy right as they are immaterial products	1	2	3	4	5
34.	It does not harm anyone	1	2	3	4	5
35.	The risk of getting caught is minimal	1	2	3	4	5
36.	Everyone else does it	1	2	3	4	5
37.	I enjoy sharing software with others	1	2	3	4	5

APPENDIX B RESEARCH WORK STATISTICAL DATA

Cross Tabulation Report

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Counts Section

A1

D20	1	2	3	Total
1	34	44	23	101
2	28	43	62	133
Total	62	87	85	234

The number of rows with at least one missing value is 2

Chi-Square Statistics Section

Chi-Square 14.379094

Degrees of Freedom 2

Probability Level 0.000754 Reject Ho

Cross Tabulation Report

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Counts Section

A2			
D20	1	2	Total
1	61	36	97
2	43	87	130
Total	104	123	227

The number of rows with at least one missing value is 9

Chi-Square Statistics Section

Chi-Square 19.884605

Degrees of Freedom 1

Probability Level 0.000008 Reject Ho

Fisher's Exact Test Section

P1	P2
Proportions	0.586538 0.292683
Difference (D0 = P1-P2)	0.293856
Correlation Coefficient	0.295969

Hypothesis	Prob Level	Test Type	Calculation Method
Ho: $P_1 = P_2$			$D = P_1 - P_2$ for a table
Ha: $P_1 < P_2$	0.999998	One-Tailed	Sum of prob's of tables where $D \leq D_0$
Ha: $P_1 > P_2$	0.000007	One-Tailed	Sum of prob's of tables where $D \geq D_0$
Ha: $P_1 \neq P_2$	0.000009	Two-Tailed	Sum of prob's of tables where $ D \geq D_0 $

Cross Tabulation Report

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Counts Section

A3

D20	1	2	3	4	5	Total
1	13	48	34	3	3	101
2	5	60	53	11	3	132
Total	18	108	87	14	6	233

The number of rows with at least one missing value is 3

Chi-Square Statistics Section

Chi-Square 9.656209

Degrees of Freedom 4

Probability Level 0.046635 Reject Ho

WARNING: At least one cell had an expected value less than 5.

Cross Tabulation Report

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Counts Section

A4

D20	1	2	3	4	5	Total
1	7	19	51	21	1	99
2	16	31	58	23	0	128
Total	23	50	109	44	1	227

The number of rows with at least one missing value is 9

Chi-Square Statistics Section

Chi-Square 4.307648

Degrees of Freedom 4

Probability Level 0.365968 Accept Ho

WARNING: At least one cell had an expected value less than 5.

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Counts Section

A5

D20	1	2	3	4	5	Total
1	16	20	13	10	40	99
2	10	19	18	15	70	132
Total	26	39	31	25	110	231

The number of rows with at least one missing value is 5

Chi-Square Statistics Section

Chi-Square 6.823496

Degrees of Freedom 4

Probability Level 0.145515 Accept Ho

Cross Tabulation Report

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Counts Section

A6

D20	1	2	3	4	5	Total
1	1	11	34	40	13	99
2	1	28	43	54	5	131
Total	2	39	77	94	18	230

The number of rows with at least one missing value is 6

Chi-Square Statistics Section

Chi-Square 9.841191

Degrees of Freedom 4

Probability Level 0.043189 Reject Ho

WARNING: At least one cell had an expected value less than 5.

Cross Tabulation Report

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Counts Section

B7

D20	1	2	3	4	5	Total
1	5	4	33	41	16	99
2	7	9	30	43	43	132
Total	12	13	63	84	59	231

The number of rows with at least one missing value is 5

Chi-Square Statistics Section

Chi-Square 10.298711

Degrees of Freedom 4

Probability Level 0.035686 Reject Ho

WARNING: At least one cell had a value less than 5.

Cross Tabulation Report

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Counts Section

B8

D20	1	2	3	4	5	Total
1	5	5	25	32	32	99
2	8	8	17	40	59	132
Total	13	13	42	72	91	231

The number of rows with at least one missing value is 5

Chi-Square Statistics Section

Chi-Square 7.241809

Degrees of Freedom 4

Probability Level 0.123648 Accept Ho

Cross Tabulation Report

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Counts Section

B9

D20	1	2	3	4	5	Total
1	5	8	14	46	26	99
2	6	6	17	52	51	132
Total	11	14	31	98	77	231

The number of rows with at least one missing value is 5

Chi-Square Statistics Section

Chi-Square 4.529326

Degrees of Freedom 4

Probability Level 0.339084 Accept Ho

WARNING: At least one cell had an expected value less than 5.

Cross Tabulation Report

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Counts Section

B10

D20	1	2	3	4	5	Total
1	3	11	23	41	20	98
2	6	10	15	57	44	132
Total	9	21	38	98	64	230

The number of rows with at least one missing value is 6

Chi-Square Statistics Section

Chi-Square 9.526158

Degrees of Freedom 4

Probability Level 0.049213 Reject Ho

WARNING: At least one cell had an expected value less than 5.

Q B7 Two-Sample Test Report

Two-Sample Test Report

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Confidence Intervals of Means

Sample	N	Mean	Standard Deviation	Standard Error	95% Lower Conf. Limit of Mean	95% Upper Conf. Limit of Mean
1	99	0.2110	0.6040	0.0607	0.0905	0.3315
2	132	0.4430	0.8040	0.0700	0.3046	0.5814

Confidence Intervals of Difference

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% Lower Conf. Limit of Difference	95% Upper Conf. Limit of Difference
Equal	229.00	-0.2320	0.7252	0.0964	-0.4210	-0.0430
Unequal	229.00	-0.2320	1.0056	0.0926	-0.4136	-0.0504

Two-Sided, Two-Sample T-Test (H0: M1 = M2 versus H1: M1 <> M2)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	229.00	-2.406	0.0169	Yes	0.6686	0.4258
Unequal	229.00	-2.504	0.0130	Yes	0.7033	0.4643

Lower, One-Sided, Two-Sample T-Test (H0: M1 = M2 versus H1: M1 < M2)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	229.00	-2.406	0.0085	Yes	0.7766	0.5326
Unequal	229.00	-2.504	0.0065	Yes	0.8048	0.5712

Upper, One-Sided, Two-Sample T-Test (H0: M1 = M2 versus H1: M1 > M2)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	229.00	-2.406	0.9915	No	0.0000	0.0000
Unequal	229.00	-2.504	0.9935	No	0.0000	0.0000

Two-Sample Test Report

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Confidence Intervals of Standard Deviations

Sample	DF	Mean Difference	Standard Deviation	Standard Error	95% Lower Conf. Limit of SD	95% Upper Conf. Limit of SD
1	99	0.2110	0.6040	0.0607	0.5300	0.7022
2	132	0.4430	0.8040	0.0700	0.7173	0.9147

Confidence Interval for Standard Deviation Ratio (SD1 / SD2)

Statistics	SD1	SD2	SD Ratio	95% Lower Conf. Limit of Var. Ratio	95% Upper Conf. Limit of Var. Ratio
SD Ratio	0.6040	0.8040	0.751	0.391	0.823

Equal Variance Test

Statistic	DF1	DF2	F-Value	Prob Level	Reject Hypothesis of Equal Variance at the 5.0% Significance Level?
Variance Ratio	98	131	1.772	0.0031	Yes

Q B8 Two-Sample Test Report

I Two-Sample Test Report
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Confidence Intervals of Means

Sample	N	Mean	Standard Deviation	Standard Error	95% Lower Conf. Limit of Mean	95% Upper Conf. Limit of Mean
1	99	0.4350	0.7800	0.0784	0.2794	0.5906
2	132	0.7000	0.9740	0.0848	0.5323	0.8677

Confidence Intervals of Difference

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% Lower Conf. Limit of Difference	95% Upper Conf. Limit of Difference
Equal	229.00	-0.2650	0.8961	0.1191	-0.4985	-0.0315
Unequal	227.99	-0.2650	1.2478	0.1155	-0.4913	-0.0387

Two-Sided, Two-Sample T-Test ($H_0: M1 = M2$ versus $H_1: M1 \neq M2$)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	229.00	-2.224	0.0271	Yes	0.6006	0.3565
Unequal	227.99	-2.295	0.0226	Yes	0.6276	0.3831

Lower, One-Sided, Two-Sample T-Test ($H_0: M1 = M2$ versus $H_1: M1 < M2$)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	229.00	-2.224	0.0136	Yes	0.7188	0.4606
Unequal	227.99	-2.295	0.0113	Yes	0.7422	0.4886

Upper, One-Sided, Two-Sample T-Test ($H_0: M1 = M2$ versus $H_1: M1 > M2$)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	229.00	-2.224	0.9864	No	0.0001	0.0000
Unequal	227.99	-2.295	0.9887	No	0.0000	0.0000

Two-Sample Test Report

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Confidence Intervals of Standard Deviations

Sample	DF	Mean Difference	Standard Deviation	Standard Error	95% Lower Conf. Limit of SD	95% Upper Conf. Limit of SD
1	99	0.4350	0.7800	0.0784	0.6844	0.9069
2	132	0.7000	0.9740	0.0848	0.8690	1.1081

Confidence Interval for Standard Deviation Ratio (SD1 / SD2)

Statistics	SD1	SD2	SD Ratio	95% Lower Conf. Limit of Var. Ratio	95% Upper Conf. Limit of Var. Ratio
SD Ratio	0.7800	0.9740	0.801	0.444	0.935

Equal Variance Test

Statistic	DF1	DF2	F-Value	Prob Level	Reject Hypothesis of Equal Variance at the 5.0% Significance Level?
Variance Ratio	98	131	1.559	0.0212	Yes

Q B9 Two-Sample Test Report

Two-Sample Test Report

Page/Date/Time 1 2010/02/15 12:42:54 PM
Database C:\safeyam\safeyam\MBA\RESEARCH\Data\The real thing.S0

Confidence Intervals of Means

Sample	N	Mean	Standard Deviation	Standard Error	95% Lower Conf. Limit of Mean	95% Upper Conf. Limit of Mean
1	99	0.4030	0.7080	0.0712	0.2618	0.5442
2	132	0.6080	0.7950	0.0692	0.4711	0.7449

Confidence Intervals of Difference

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% Lower Conf. Limit of Difference	95% Upper Conf. Limit of Difference
Equal	229.00	-0.2050	0.7590	0.1009	-0.4028	-0.0072
Unequal	222.28	-0.2050	1.0646	0.0993	-0.3995	-0.0105

Two-Sided, Two-Sample T-Test (H0: M1 = M2 versus H1: M1 <> M2)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	229.00	-2.031	0.0434	Yes	0.5252	0.2881
Unequal	222.28	-2.065	0.0400	Yes	0.5385	0.2995

Lower, One-Sided, Two-Sample T-Test (H0: M1 = M2 versus H1: M1 < M2)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	229.00	-2.031	0.0217	Yes	0.6507	0.3857
Unequal	222.28	-2.065	0.0200	Yes	0.6632	0.3987

Upper, One-Sided, Two-Sample T-Test (H0: M1 = M2 versus H1: M1 > M2)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	229.00	-2.031	0.9783	No	0.0001	0.0000
Unequal	222.28	-2.065	0.9800	No	0.0001	0.0000

Two-Sample Test Report

Page/Date/Time 2 2010/02/15 12:42:54 PM
 Database C:\safeyam\safeyam\MBA\RESEARCH\Data\The real thing.S0

Confidence Intervals of Standard Deviations

Sample	DF	Mean Difference	Standard Deviation	Standard Error	95% Lower Conf. Limit of SD	95% Upper Conf. Limit of SD
1	99	0.4030	0.7080	0.0712	0.6212	0.8231
2	132	0.6080	0.7950	0.0692	0.7093	0.9045

Confidence Interval for Standard Deviation Ratio (SD1 / SD2)

Statistics	SD1	SD2	SD Ratio	95% Lower Conf. Limit of Var. Ratio	95% Upper Conf. Limit of Var. Ratio
SD Ratio	0.7080	0.7950	0.891	0.549	1.156

Equal Variance Test

Statistic	DF1	DF2	F-Value	Prob Level	Reject Hypothesis of Equal Variance at the 5.0% Significance Level?
Variance Ratio	98	131	1.261	0.2273	No

Q B10 Two-Sample Test Report

Two-Sample Test Report
 Page/Date/Time 1 2010/02/15 12:44:15 PM
 Database C:\safeyam\safeyam\MBA\RESEARCH\Data\The real thing.S0

Confidence Intervals of Means

Sample	N	Mean	Standard Deviation	Standard Error	95% Lower Conf. Limit of Mean	95% Upper Conf. Limit of Mean
1	98	0.2860	0.6450	0.0652	0.1567	0.4153
2	132	0.5130	0.7580	0.0660	0.3825	0.6435

Confidence Intervals of Difference

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95% Lower Conf. Limit of Difference	95% Upper Conf. Limit of Difference
Equal	228.00	-0.2270	0.7121	0.0950	-0.4131	-0.0409
Unequal	223.73	-0.2270	0.9953	0.0927	-0.4087	-0.0453

Two-Sided, Two-Sample T-Test (H0: M1 = M2 versus H1: M1 $\neq$ M2)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	228.00	-2.391	0.0176	Yes	0.6630	0.4197
Unequal	223.73	-2.448	0.0151	Yes	0.6835	0.4420

Lower, One-Sided, Two-Sample T-Test (H0: M1 = M2 versus H1: M1 < M2)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	228.00	-2.391	0.0088	Yes	0.7720	0.5265
Unequal	223.73	-2.448	0.0076	Yes	0.7889	0.5492

Upper, One-Sided, Two-Sample T-Test (H0: M1 = M2 versus H1: M1 > M2)

Variance Assumption	DF	T-Value	Prob Level	Conclude H1 at 5.0% Significance?	Power (Alpha=0.05)	Power (Alpha=0.01)
Equal	228.00	-2.391	0.9912	No	0.0000	0.0000
Unequal	223.73	-2.448	0.9924	No	0.0000	0.0000

Page/Date/Time 2 2010/02/15 12:44:15 PM
 Database C:\safeyam\safeyam\MBA\RESEARCH\Data\The real thing.S0

Confidence Intervals of Standard Deviations

Sample	DF	Mean Difference	Standard Deviation	Standard Error	95% Lower Conf. Limit of SD	95% Upper Conf. Limit of SD
1	98	0.2860	0.6450	0.0652	0.5656	0.7505
2	132	0.5130	0.7580	0.0660	0.6763	0.8624

Confidence Interval for Standard Deviation Ratio (SD1 / SD2)

Statistics	SD1	SD2	SD Ratio	95% Lower Conf. Limit of Var. Ratio	95% Upper Conf. Limit of Var. Ratio
SD Ratio	0.6450	0.7580	0.851	0.501	1.057

Equal Variance Test

Statistic	DF1	DF2	F-Value	Prob Level	Reject Hypothesis of Equal Variance at the 5.0% Significance Level?
Variance Ratio	97	131	1.381	0.0941	No

Data from distribution fitting algorithm for Religious commitment for two sample T-test:

	YES to Qu.20				NO to Qu.20			
	B7	B8	B9	B10	B7	B8	B9	B10
Observed								
Strongly disagree	5	5	5	3	7	8	6	6
Disagree	4	5	8	11	9	8	6	10
Neither	33	25	14	23	30	17	17	15
Agree	41	32	46	41	43	40	52	57
Strongly agree	16	32	26	20	43	59	51	44
	99	99	99	98	132	132	132	132
Solver parameters								
μ	-0.0654	0.05191	0.03502	-0.0263	0.05615	0.19121	0.14252	0.09294
σ	0.3167	0.40913	0.37171	0.33826	0.42206	0.51115	0.41745	0.39779
Expected								
Strongly disagree	3.66277	4.70054	3.61651	3.6112	6.82322	7.10218	4.21066	4.533
Disagree	10.4264	8.40865	8.12804	9.31399	11.3471	9.00285	8.34475	9.41408
Neither	27.9551	19.7801	21.2083	24.7614	25.8378	19.2332	21.8128	24.518
Agree	41.4581	35.3583	38.54	40.3582	45.8077	37.1192	45.5354	48.2945
Strongly agree	15.4976	30.7524	27.5072	19.9552	42.1842	59.5426	52.0964	45.2404
χ^2 contributions								
Strongly disagree	0.4882	0.01908	0.52925	0.10345	0.00458	0.1135	0.76039	0.47476
Disagree	3.96094	1.38178	0.00202	0.3052	0.48548	0.11171	0.65884	0.03647
Neither	0.91041	1.37753	2.44996	0.1253	0.67048	0.25931	1.0619	3.69495
Agree	0.00506	0.31897	1.444	0.01021	0.17209	0.22358	0.91776	1.56925
Strongly agree	0.01629	0.05061	0.08258	0.0001	0.01578	0.00494	0.02307	0.03401
66.47383065	5.3809	3.14798	4.50781	0.54425	1.3484	0.71304	3.42196	5.80943
Solver thresholds								
Standardised thresholds								
τ_1	-0.6312	τ_1	-0.8669					
τ_2	-0.4043	τ_2	-0.4344					
τ_3	-0.1256	τ_3	0.09673					
τ_4	0.25405	τ_4	0.82014					
Standardised parameters								
μ	0.2113	0.4349	0.4028	0.2859	0.443	0.7004	0.6076	0.5131
σ	0.6035	0.7797	0.7083	0.6446	0.8043	0.9741	0.7955	0.758
Index	1	2	3	4	5	6	7	8
z	3.48428	5.55073	5.6574	4.39132	6.32844	8.26117	8.77553	7.7769
significance of Z								
Chi-test p-value	0.9579							

Distribution fitting algorithm for motivating factors:

	YES to Qu. 20														
	E23	E24	E25	E26	E27	E28	E29	E30	E31	E32	E33	E34	E35	E36	E37
Observed															
Strongly disagree	17	8	4	39	64	41	32	31	15	22	34	31	23	19	21
Disagree	17	8	6	18	15	21	21	25	8	25	26	28	14	12	15
Neither	12	15	17	24	11	21	26	20	13	36	23	21	25	18	37
Agree	28	41	28	12	8	13	15	17	30	12	10	14	27	30	18
Strongly agree	27	29	46	8	2	5	7	7	35	6	7	7	11	22	10
	101	101	101	101	100	101	101	100	101	101	100	101	100	101	101
Solver parameters															
μ	-0.1048	0.02965	0.19382	-0.4876	-0.8209	-0.5273	-0.4285	-0.4297	0.03182	-0.3663	-0.4672	-0.4396	-0.2787	-0.1414	-0.2968
σ	0.56213	0.43006	0.47948	0.4965	0.53012	0.45626	0.4364	0.43833	0.5976	0.35114	0.43519	0.42361	0.45168	0.52981	0.39497
Expected															
Strongly disagree	17.6265	6.27992	4.30722	39.0063	63.9717	41.3993	32.4325	32.279	13.4928	22.7476	35.3123	32.8756	21.753	17.9387	20.0562
Disagree	12.383	9.52533	6.41115	18.2273	14.4303	19.8349	20.3024	20.0288	10.0164	23.3972	20.4376	20.9818	17.2951	13.3617	19.6149
Neither	19.0054	20.4619	14.8008	20.2415	12.1153	20.6473	23.6421	23.2997	16.4998	29.9556	22.6297	23.9901	24.2215	20.406	27.7675
Agree	25.565	34.3412	30.0288	16.6967	7.35324	14.7352	18.6736	18.452	25.1363	20.9959	16.7484	18.0258	24.8199	26.2966	25.3252
Strongly agree	26.4202	30.3917	45.4521	6.82819	2.12955	4.38323	5.94929	5.94058	35.8546	3.90376	4.87208	5.12667	11.9105	22.9969	8.23625
χ^2 contributions															
Strongly disagree	0.02227	0.47113	0.02191	1E-06	1.3E-05	0.00385	0.00577	0.05067	0.16835	0.02457	0.04877	0.107	0.07148	0.06279	0.04441
Disagree	1.72143	0.24426	0.02637	0.00283	0.02249	0.06844	0.02397	1.23388	0.40593	0.1098	1.51392	2.34751	0.62778	0.13878	1.08577
Neither	2.58217	1.45793	0.32678	0.6979	0.10266	0.00602	0.23516	0.46729	0.74237	1.21964	0.00606	0.37269	0.02502	0.28369	3.06974
Agree	0.23193	1.29115	0.13707	1.32118	0.05689	0.20434	0.7227	0.11426	0.94108	3.85436	2.71912	0.89911	0.1915	0.52156	2.11877
Strongly agree	0.01273	0.06373	0.0066	0.2011	0.00788	0.08679	0.18557	0.18893	0.02037	1.12564	0.92939	0.68453	0.0696	0.04322	0.3777
	66.47383065	4.57053	3.52819	0.51873	2.22301	0.18994	0.36944	1.17316	2.05504	2.27809	6.33401	5.21726	4.41084	0.98538	1.05004
Solver thresholds															
τ_1															
τ_2															
τ_3															
τ_4															
Standardised parameters															
μ	0.1362	0.3925	0.7054	-0.593	-1.228	-0.669	-0.481	-0.483	0.3967	-0.362	-0.554	-0.502	-0.195	0.0665	-0.23
σ	1.0712	0.8195	0.9137	0.9461	1.0102	0.8695	0.8316	0.8353	1.1388	0.6691	0.8293	0.8072	0.8607	1.0096	0.7527
Index	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	4	3	1	13	15	14	9	10	2	8	12	11	6	5	7
z	1.27798	4.81332	7.75839	-6.3016	-12.158	-7.731	-5.8073	-5.7793	3.50052	-5.4359	-6.6844	-6.2465	-2.2663	0.66185	-3.066
significance of Z	4	2	1	12	15	14	10	9	3	8	13	11	6	5	7