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**Antecedents of Computer Self-Efficacy and Behavioral Intention to Use New IT:
An Investigation of the Role of Personality Traits**

Huma Saleem

A Thesis

in

The John Molson School of Business

Presented in Partial Fulfillment of the Requirements
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ABSTRACT

Antecedents of Computer Self-Efficacy and Behavioral Intention to Use New IT: An Investigation of the Role of Personality Traits

Huma Saleem

Computer self-efficacy has been shown to play an important role in one's decision to use new information technology. While there has been a wealth of research on the antecedents of CSE, only a few have examined CSE's relationship with individual characteristics and it is only recently that the role of stable individual traits has gained prevalence. Meanwhile, in the 1990's, researchers converged upon the Five-Factor Model of personality as the premiere framework of personality and uncovered several relationships between these 5 factors of personality (neuroticism, extraversion, openness, conscientiousness, and agreeableness) and organizational behavior variables.

Due to a needed focus on individual differences as they relate to IT use, in conjunction with the emergence of the five-factor model of personality as a credible tool in psychology, the present study aims at investigating the relationships between the five factors of personality and computer self-efficacy.

A web-survey of 143 faculty members and graduate students who had not yet used the Self-Checkout library system available at a large Canadian university was conducted. Results suggest that extraversion is positively related to CSE, while neuroticism is negatively related to CSE. Results also indicate a positive relationship between CSE and perceived ease of use, and a positive relationship between PEOU and behavioral intention to use new IT. The study offers a humanistic viewpoint to the technology adoption literature, adds to research examining the relationship between stable and dynamic individual differences, and to organizational behavior literature that has shown a renewed interest in the role of personality in organizational contexts. Results are also useful in training and selection processes.

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INTRODUCTION

This thesis reports on a study that aims at investigating the antecedents of computer self-efficacy (CSE). More specifically, the relationships between five stable personality traits and CSE were examined. Computer self-efficacy has been shown to play an important role in one's decision to use new information technology (IT) (Compeau, Higgins, and Huff, 1999). While there has been a wealth of research on the antecedents of CSE (Marakas, Yi, and Johnson, 1998), only a few have examined CSE's relationship with individual characteristics and it is only recently that the role of stable personality traits has gained prevalence. Thatcher and Perrewe (2002) underline that in order to gain a better understanding of the role of personality in IT, research is needed to examine how different stable traits, both broad and situation-specific, relate to constructs such as CSE that influence eventual computer use.

Meanwhile, the study of personality as a predictor of organizational behavior variables has been going on for decades. Although early research demonstrated low validity, they came at a time when no well-accepted taxonomy for classifying personality traits existed (Barrick and Mount, 1991). However, in the 1990's researchers converged upon the Five-Factor Model of personality (Costa and McCrae, 1988; 1992), the premiere framework of personality, and uncovered several relationships between these 5 factors of personality (neuroticism, extraversion, openness, conscientiousness, and agreeableness) and organizational behavior variables (e.g., Thoms et al., 1996; Wooten, 1991). Thus the current study is based on the emergence of the five-factor model of personality as a credible tool in psychology and in organizational behavior studies, in addition to the

needed focus on individual differences as they relate to the behavioral intention to use new IT.

A web-survey of 143 faculty members and graduate students who had not yet used the Self-Checkout library system available at a large Canadian university was conducted. Results suggest that two of the five personality traits, extraversion and neuroticism, are significantly related to CSE. Extraversion is shown to be positively related to CSE, while neuroticism is shown to be negatively related to CSE. This study has also shed further light on the research involving the relationship between computer self-efficacy, perceived ease of use, and behavioral intention to use technology, as CSE is shown to be positively related to PEOU, which in turn is positively related to behavioral intention to use technology.

This study contributes to current technology adoption literature by examining the role of individual differences, and by uncovering individual traits as antecedents to eventual IT acceptance. In addition, the research contributes to literature investigating the relationship between stable and dynamic individual differences. Furthermore, it adds to organizational behavior literature that has shown a renewed interest in the role of personality due to the convergence on the FFM as the premiere taxonomy of traits. Results also provide managerial implications, as individual differences may be used for training and selection processes in organizations where new information technologies are being implemented.

CHAPTER 1: LITERATURE REVIEW

This chapter examines the literature that is relevant to the present thesis. Specifically, the concepts of behavioral intention, computer self-efficacy, and personality traits, as well as their relationships with one another are investigated. An outline for improving our understanding of these concepts is also presented.

1.1 - BEHAVIORAL INTENTION TO USE INFORMATION TECHNOLOGY

The deployment of information technology (IT) in organizations has become an inevitable reality. The Department of Commerce (1998) estimates that about 46% of all equipment spending in the United States is in IT equipment and software (Devaraj and Kohli, 2003). In spite of economic slowdown, spending by the IT sector is expected to increase (U.S. Department of Commerce 2001). Furthermore, with increased investments in IT comes the responsibility to provide economic justification. Today, more than ever, IT executives encounter the justification issue due to senior management's insistence that the investment be properly utilized (Devaraj and Kohli, 2003). These investments are due to various pressures, such as cutting costs, increasing production without increasing costs, or simply improving the quality of services or products in order to remain in business (Legris, Ingham, and Colletette, 2003). The rapid growth of technology has also led to the development of larger and more sophisticated information systems. Organizations are placing greater demands on these systems than ever before, requiring them to coordinate global as well as vertically integrated operations, while simultaneously satisfying the conflicting needs of users (Jackson, Chow, and Leitch, 1997).

The notion of usage as a key dependent variable has become a particular point of interest for many management information systems' (IS) researchers (Davis, 1989, 1993; Davis et al., 1989, 1992; Adams et al., 1992; Mathieson,

1991; Moore and Benbasat, 1993; Thompson et al., 1991; Hartwick and Barki, 1994). Despite the enormous expenditure of time, capital, and effort that is made on IT, these investments alone can not guarantee substantial benefits and the true benefits and impacts of IT are contingent on the extent to which individual users appropriate and use IT in their ongoing work activities (Lewis et al., 2003). Although senior managers make the primary adoption decisions related to IT, the individuals within these firms are the ultimate users and consumers of the technology (Lewis et al., 2003).

The problem of underutilized systems has been researched and chronicled (Johansen and Swigart, 1996; Moore, 1991; Norman, 1993; Weiner, 1993), and low usage has been listed as one of the underlying causes behind the productivity paradox, the failure of massive investment in information technology to boost productivity growth, that is associated with IT investments (Landauer, 1995; Sichel, 1997). Indeed, performance gains are often impeded by users' unwillingness to accept and use available systems (Bowen, 1986; Young, 1984). No system, regardless of its quality and technical merits, can be effective if it is not used (Mathieson, 1991). It is therefore not surprising that understanding the conditions under which IT are or are not accepted and used within organizations remains one of the most prominent issues in IS research (Venkatesh and Morris, 2000). The development and testing of models that may help in predicting system use has, in fact, been a primary concern for IS researchers since the mid-eighties (Legris et al., 2003). Furthermore, explaining user acceptance of new IT is now considered one of the most mature research areas in contemporary IS literature (Venkatesh, Morris, and Davis, 2003).

The great interest in user acceptance of IT, defined as *"the obvious willingness within a group to use IT for the tasks it is designed to support"* (Dillon and Morris, 1996, p.4) has resulted in numerous theoretical models stemming not only from information systems, but also psychology and sociology. For instance, early efforts to explain system use borrowed from psychology to develop tools for measuring and analyzing computer user satisfaction (Powers and Dickson, 1973; Bailey and Pearson, 1983), which was theorized to influence actual use. Emphasis was thus placed on determining antecedents to user satisfaction, considered in psychology to be the *"sum of one's feelings or attitudes toward a variety of factors affecting the situation"* (Bailey and Pearson, 1983). For their part, Bailey and Pearson (1983) identified 39 factors affecting user satisfaction, including top management involvement, expectations, perceived utility, feeling of control, and degree of training.

More recently, focus has shifted to the measurement of actual use or the behavioral intention to use IT. To assess the current state of knowledge regarding individual IT acceptance and adoption, Venkatesh et al. (2003) performed a review of eight existing user acceptance models. The eight models reviewed were the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of Planned Behavior (TPB), a model combining the technology acceptance model and the theory of planned behavior, the model of PC utilization (PCU), the Innovation Diffusion Theory (IDT), and the Social Cognitive Theory (SCT). There are two main approaches in technology acceptance. IDT (Rogers, 1995; Moore and Benbasat, 1991) represents one approach to user technology acceptance, which *concentrates on the characteristics inherent to a specific technology* and their influence on acceptance. Alternatively, several other

models fall under the category of *intention-based models* (e.g., TRA, TAM, TPB), which base their analyses on how characteristics of the technology, and use of the technology, are *perceived by the target users* (Chau and Hu, 2002). Intention-based models specifically focus on how behavioral intention influences actual usage, and therefore concentrate on identifying the determinants of users' intention to use IT (Taylor and Todd, 1995).

Intention-based research is primarily grounded in the Theory of Reasoned Action, a widely studied model from social psychology (Fishbein and Ajzen, 1975). TRA is considered one of the most fundamental and influential theories of human behavior and according to Fishbein and Ajzen (1975) it provides a framework to study attitudes towards any behavior. The theory postulates that the most important determinant of a person's behavior is **behavioral intention (BI)** which can be defined as a measure of the *"strength of one's intention to perform a specific behavior"* (Fishbein and Ajzen, 1975, p. 288). In TRA, the individual's intention to perform a behavior is said to be determined by a combination of 1) his or her attitude towards performing the behavior and 2) subjective norms. Attitude towards a behavior is *"an individual's positive or negative feelings (evaluative affect) about performing the target behavior"* (Fishbein and Ajzen, 1975, p. 216). Theoretically, this attitude is formed by individual beliefs that the behavior will lead to certain outcomes as well as individual evaluations of these outcomes. Meanwhile, subjective norms are *"the person's perception that most people who are important to him/her think one should, or should not, perform the behavior in question"* (Fishbein and Ajzen, 1975, p. 302). The basic TRA model is presented in Figure 1.1.

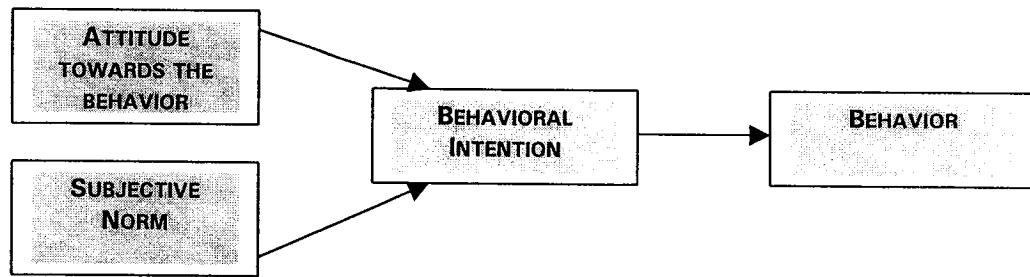


Figure 1.1: Theory of Reasoned Action (Fishbein and Ajzen, 1975)

The Theory of Planned Behavior (TPB) (Ajzen, 1991), which was derived from TRA, also follows the belief-intention-behavior thread (Chau and Hu, 2002). It states that behavioral intention is jointly determined by three factors: attitude, subjective norms, and perceived behavioral control (Figure 1.2). The additional construct of **perceived behavioral control** refers to *“the perceived ease or difficulty of performing the behavior”* (Ajzen, 1991, p. 188). Taylor and Todd (1995) later redefined the construct in the context of IS research as *“perceptions of internal and external constraints on behavior”* (p. 149). Therefore, perceived behavioral control reflects beliefs regarding access to resources and opportunities required to perform a behavior, or alternatively, to the internal and external factors that may impede performance of the behavior (Taylor and Todd, 1995). TPB has since been successfully applied to the understanding of individual acceptance and usage of many different technologies (Harrison et al., 1997; Mathieson, 1991; Taylor and Todd, 1995).

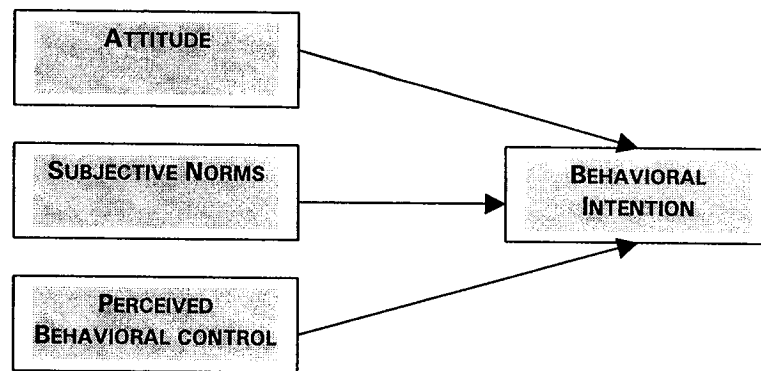


Figure 1.2: Theory of Planned Behavior (Ajzen, 1991)

The intention-based line of research became particularly relevant in the IS field with Davis' (1989) formulation of the Technology Acceptance Model (TAM), in which behavioral intention is significantly correlated with usage of IT. TAM follows the same logic as TRA in that behavioral intention is considered a primary determinant of user behavior while other factors influence user behavior indirectly through behavioral intention. TAM (Figure 1.3) postulates that two sets of beliefs in particular, **perceived usefulness (PU)** and **perceived ease of use (PEOU)** are related to one's behavioral intention to use an IT. Davis (1989, p. 320) defines perceived usefulness as *"the degree to which a person believes that using a particular system would enhance his or her job performance"*. Meanwhile, perceived ease of use refers to *"the degree to which a person believes that using a particular system would be free of effort"*. Empirical results using TAM in various contexts and with different information technologies, have validated the model and shown that PU and PEOU together explain approximately 40% of the variance of behavioral intention to use IT (e.g., Chau and Hu, 2002; Davis, Bagozzi, and Warshaw, 1989; Venkatesh, 2000).

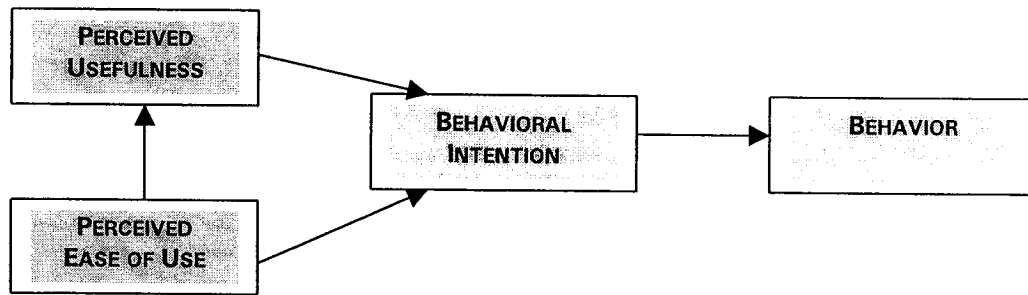


Figure 1.3: Technology Acceptance Model (Davis, 1989)

Furthermore, research has shown that behavioral intention to use IT is significantly related to actual usage. Hill, Smith, and Mann (1987), Taylor and Todd (1995), both indicated that behavioral intentions significantly predict action. Sheppard, Hartwick, and Warshaw (1988) in a meta-analysis of 86 TRA studies found an average correlation of .54 between intentions and action. Davis et al. (1989) also found that behavioral intention to use IT is significantly correlated with usage, and is a major determinant of use behavior while other factors such as PU and PEOU influence behavior indirectly through behavioral intention. In general, behavioral intention has proved to be a better indicator of system usage than other competing predictors such as realism of expectations (Ginzberg, 1981), motivational force (DeSanctis, 1983), value (Swanson, 1987), user information satisfaction (Baroudi et al., 1986), and user satisfaction (Srinivasan, 1985). In addition, behavioral intention has been a better and more appropriate measure of IT acceptance in situations where systems have not been fully implemented or are to be used some time in the immediate future (Jackson et al., 1997).

Nevertheless, the knowledge that behavioral intention to use IT is related to eventual use is not merely enough. Past literature suggests that *"the determination of factors affecting behavioral intention to use a system is important to our*

understanding of their role in the successful implementation of information systems" (Jackson et al., 1997, p. 361). In the last decade of intention-based research the constructs presented in TAM and related theories such as TRA and TPB, have undoubtedly been at the forefront with regards to their influence on behavioral intention. However, TAM presents a decidedly techno-centric view of technology acceptance, as it deals with how users perceive characteristics of the *technology* itself.

On the other hand, the views presented by Social Cognitive Theory, and more specifically by the construct of **computer self-efficacy (CSE)**, present a much more humanistic viewpoint to the intention-based line of MIS research. The notion of computer self-efficacy is particularly focused on the *behavioral factors* that influence IT adoption and use. Based in social psychology, CSE provides a unique behavioral viewpoint to IT adoption and use, which is of interest to the present study. As such, the foundations of CSE and its usefulness in MIS research are examined in the following section.

1.2 - SELF-EFFICACY

Social cognitive theory (Bandura, 1986) advocates a view of individuals as proactive in their own development. Furthermore, Social Cognitive Theory (SCT) postulates that people are not solely driven by inner forces, and instead suggests that behavior can be explained in terms of an interaction between a person and the environment. Bandura's (1986) *reciprocal determinism*, maintains that 1) personal factors in the form of cognition, affect, and biological events, 2) behavior, and 3) environmental influences create interactions that result in a *triadic reciprocity* (see Figure 1.4).

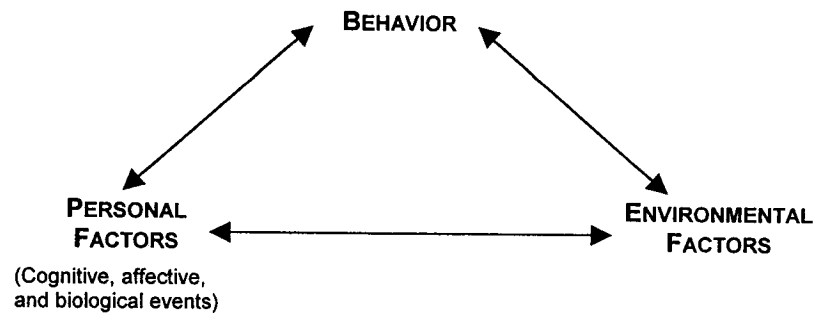


Figure 1.4: Triadic Reciprocity (Bandura, 1986)

Focusing on the personal factors, SCT advances two sets of expectations as the main cognitive forces guiding behavior. Primarily, individuals will be more apt to undertake behaviors with expected favorable outcomes. Secondly, individuals will be influenced by self-efficacy expectations. Specifically, when considering taking action, as well as once engaged in action, people make judgements concerning their ability to perform various task requirements. Self-efficacy, a central construct of SCT, has been defined as:

“People’s judgements of their capabilities to organize and execute courses of action required to attain designated types of performance. It is concerned not with the skills one has but with judgements of what one can do with whatever skills one possesses” (Bandura, 1986, p. 391).

According to Marakas, Yi, and Johnson (1998), self-efficacy not only reflects an individual’s perception of his or her ability to perform a particular task, but it is also a major influence on future intentions. Self-efficacy beliefs cause individuals to weigh, integrate, and evaluate information about their capabilities and subsequently regulate their choices and efforts accordingly (Bandura, Adams, Hardy, and Howells, 1980).

Self-efficacy can be evaluated on three dimensions: 1) magnitude, 2) strength, and 3) generalizability (Bandura, 1977). Primarily, *magnitude* refers to the level of task difficulty that a person believes he or she can attain. Therefore,

individuals with a high magnitude of self-efficacy will envision themselves as able to accomplish difficult tasks, while those low in magnitude will only envision the accomplishment of simple tasks. Secondly, *strength* refers to whether the conviction regarding magnitude is strong or weak. Thus, individuals with a strong sense of self-efficacy will not be deterred by difficulties, are more likely to persist, and eventually overcome obstacles. Meanwhile, those with a weak sense of self-efficacy will be easily deterred and frustrated by obstacles, and are also more likely to lower their perceptions of their capabilities. Finally, *generalizability* refers to the degree to which perceptions of self-efficacy are limited to particular situations. For instance, some individuals may believe that they are capable of performing a particular behavior only under certain circumstances, while others may believe that they are capable of performing the behavior under all circumstances.

1.2.1 - Influences on Self-Efficacy

Social cognitive theory also emphasizes four main influences on the formation of self-efficacy beliefs: 1) mastery experiences, 2) vicarious experiences, 3) social persuasion, and 4) individual's perceptions of his or her physiological state.

First of all, *mastery experiences*, or repeated performance accomplishments (Bandura, 1982), build a person's sense of self-efficacy, while failures undermine the sense of self-efficacy. Mastery is facilitated when gradual accomplishments build the skills, coping abilities, and exposure needed for task performance (Gist, 1987).

Secondly, individuals often seek out others (social models) whose competencies they wish to acquire. Thus, *vicarious experiences* provided by social models, and their successes or failures, will impact one's own sense of self-

efficacy. Vicarious experiences may not be as influential as one's own mastery experiences, but may be useful when mastery experiences are not available (Bandura, 1977). Social models can serve to transmit knowledge and teach observers effective skills and strategies to manage environmental demands. Modeling is even more effective when the models succeed after overcoming difficulty than when they succeed with ease (Bandura et al., 1980). In addition, the effects are greater when the model and subject are similar in terms of age, capability, and other personal characteristics (Bandura, 1977).

Social persuasion by others can also positively influence one's self-efficacy. Those who are persuaded verbally that they are capable of succeeding are more likely to exert the needed effort to achieve and maintain success. Social (or verbal) persuasion is not deemed as effective as mastery or modeling, but can be influential in certain situations (Bandura, 1982). Factors such as expertness and credibility of the source, consensus among multiple sources and evidence of familiarity of the source with task demands can also serve to affect the success of verbal persuasion (Gist, 1987).

Finally, an individual's *perceptions of his or her physiological state* may be used in assessing performance capability. The way in which emotional and physical reactions are perceived and interpreted can affect one's sense of self-efficacy. Thus, individuals with a high sense of efficacy are likely to view their state of affective arousal as an energizing facilitator of performance, whereas those who are plagued with self-doubts view their emotional and physical arousal as a debilitation (Bandura, 1977).

Nevertheless, while social cognitive theory may emphasize the role of the four influences discussed above, the literature has revealed that the estimation of

self-efficacy is a composite of numerous factors (Marakas et al., 1998). Furthermore, each factor has an effect on an individual's judgement of his/her capability, and on the relationship of the self-efficacy judgement to actual behavior and/or performance.

1.2.2 - Self-Efficacy in Organizational Literature

Bandura's original application of self-efficacy was developed in the context of treating severe phobias. Nevertheless, applied psychology and organizational behavior research have adopted the construct and extended it beyond its original purpose (Marakas et al., 1998). Social learning theory (Bandura, 1977, 1986) actually posits that self-efficacy is a major determinant of choice of activities, period of persistence, degree of effort, and level of performance in the face of challenging situations – situations that are common to the organizational setting.

Organizational behavior research has concurred with these postulations. For instance, Barling and Beattie (1983) found that self-efficacy perceptions were strongly correlated to sales performance. In another study, Taylor, Locke, Lee, and Gist (1984) found that self-efficacy was directly related to research productivity among university faculty members. Gist (1987), in a seminal paper, discussed the relationship of self-efficacy to motivational concepts such as goal setting, feedback, intrinsic interest and reinforcement, expectancy theory, and locus of control. In fact, empirical research on self-efficacy has consistently found that it has a significant impact on performance on a variety of tasks as well as on motivation (i.e., effort), emotional reactions, and persistence on a task (Gist and Mitchell, 1992). Over the years, empirical studies have validated the influence of self-efficacy on employee attendance management (Frayne and Latham, 1987), idea generation

among managers (Gist, 1989), complex decision making (Wood and Bandura, 1989), computer skills acquisition (Gist et al., 1989; Mitchell, Hopper, Daniels, George-Falvy, and James, 1994), military volunteering (Eden and Kinnar, 1991), job search training (Eden and Aviram, 1993), and socialization training (Saks, 1995).

1.2.3 - Computer Self-Efficacy

While general self-efficacy has been positively related to measures of performance and motivation, it has been found that the predictive capability of a self-efficacy estimate is strongest and most accurate when determined by specific domain-linked measures rather than with general measures (Bandura, 1989). Thus, over the years, IS researchers have developed the construct and measurement of computer self-efficacy (CSE) which has been studied as a factor affecting computer use and performance (Hill et al., 1987; Murphy et al., 1989; Compeau and Higgins, 1995b). Computer self-efficacy is defined as a *“judgement of one’s capability to use a computer”* (Compeau and Higgins, 1995b, p. 192). It has been suggested that CSE plays a significant role in an individual’s decision to use computers, as well as in the ease with which many of the skills associated with effective computer use are acquired (Marakas et al., 1998). Individuals with a high CSE are more likely to form positive perceptions of IT (Venkatesh and Davis, 1996), and use IT more frequently (Compeau, Higgins, and Huff, 1999).

Two forms of CSE have been identified: **task-specific CSE** and **general CSE**. Primarily, task-specific CSE refers to *“an individual’s perception of efficacy in performing specific computer-related tasks within the domain of general computing”* (Marakas et al., 1998, p. 128). This may be utilized at an application environment level (e.g., Windows 2002), or an application specific level (e.g., Microsoft Word,

Lotus Notes). This form of CSE is said to more closely resemble the original conceptualization of self-efficacy proposed by Bandura. It focuses on an individual's perception of his/her ability with regard to a specific tool, and does not constrain his perception with a task situation that requires cross-domain knowledge (Marakas et al., 1998). On the other hand, general CSE refers to *"an individual's judgement of efficacy across multiple computer application domains"* (Marakas et al., 1998, p. 129). This form of CSE can be considered as the result of a lifetime of computer-related experiences, and has been used extensively in IS literature (e.g., Martocchio, 1994; Compeau and Higgins, 1995a, 1995b; Igbaria and Iivari, 1995).

CSE and Behavioral Intention to Use IT: Empirically, social psychologists have found that self-efficacy in a computer/information technology context is an important determinant of the perceptions of users about such technologies (Burkhardt and Brass 1990; Gist et al., 1989; Hill et al., 1986; Hill et al., 1987). There are several ways in which CSE is found to influence the use of technology. In a longitudinal study, Compeau et al. (1999) demonstrated numerous pathways, indirect and direct, relating CSE to usage. Computer self-efficacy, (measured at Time 1) was shown to be a strong and significant predictor of usage (measured at Time 2) through affect, anxiety, and performance-related outcome expectations, as well as a strong predictor of usage itself (Figure 1.5). Gathering data from 394 end users over a one-year interval, it was found that, taking into account both the direct and indirect effects, self-efficacy explains a total of 18% of the variance of IT use by individuals.

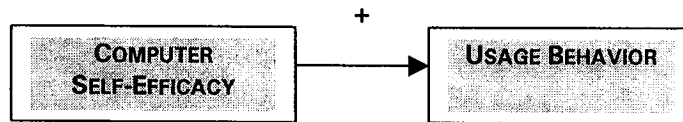


Figure 1.5: Derived from Compeau et al. (1999)

Both direct and indirect relationships have also been found between CSE and behavioral intention to use or adopt technology. Hill et al. (1987) reported that CSE was a significant determinant of behavioral intentions to use computer technology, independent of beliefs regarding the instrumental value of using computers (Figure 1.6).

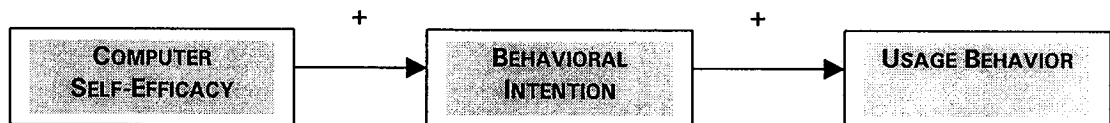


Figure 1.6: Derived from Hill et al. (1987)

Another possible relationship between computer self-efficacy and behavioral intention to use IT can be found through the theory of planned behavior. The construct **perceived behavioral control** is said to encompass two components. The first component reflects the "*facilitating conditions*" (Triandis, 1979), or availability of resources needed to engage in a behavior, such as time and money (Taylor and Todd, 1995). Meanwhile, the second component has been recognized as self-efficacy. Given that perceived behavioral control has, in past research, demonstrated a significant relationship with both behavioral intention (Taylor and Todd 1995; Mathieson, 1991) and usage behavior (Taylor and Todd, 1995), its component, self-efficacy, is said to influence intention and usage indirectly (Figure 1.7).

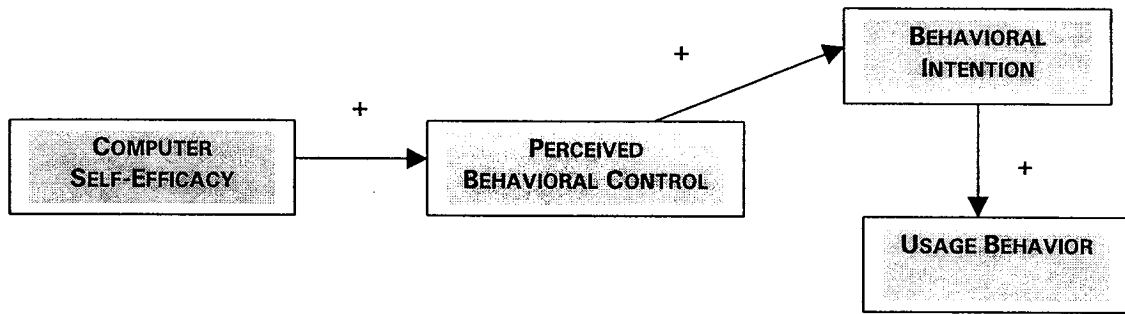


Figure 1.7: Derived from Taylor and Todd (1995) and Mathieson (1991)

Venkatesh et al. (2003) found CSE to have a direct effect on intention to use IT. However, CSE showed no effect on intention above and beyond that of effort expectancy, defined as *"the degree of ease associated with the use of the system"* (p. 450). This finding is in keeping with previous research suggesting that CSE's influence on behavioral intention is fully mediated by the TAM construct perceived ease of use (PEOU) (Venkatesh and Davis, 1996; Venkatesh, 2000), which is similar in concept to effort expectancy.

Venkatesh and Davis (1996) were the first to explore the relationship between self-efficacy and perceived ease of use, drawing on earlier indications that the two may be associated (Figure 1.8). Findings from three experiments involving 108 subjects and six different systems supported the hypothesis that an individual's perception of a particular system's ease of use is anchored to her or his general CSE at all times. This finding was even more significant because it dispelled the notion that ease of use perceptions are determined solely by usability features of the system.

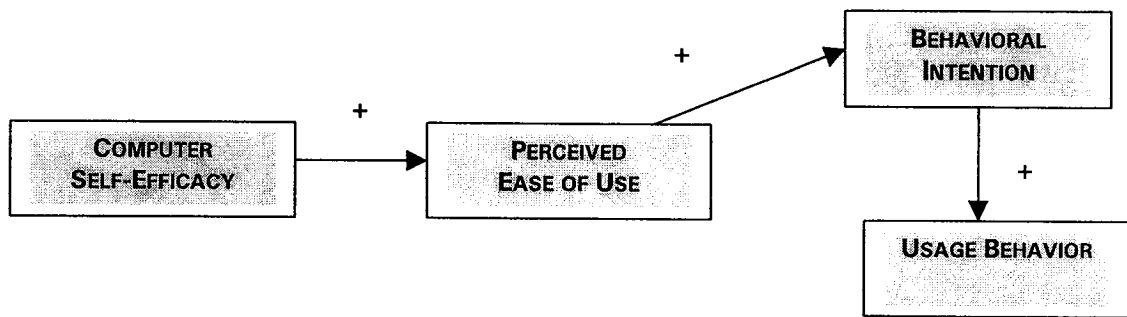


Figure 1.8: Derived from Venkatesh and Davis (1996)

In a later study, Venkatesh (2000) found that CSE was one of several individual difference variables and situational characteristics, including perceptions of external control, computer anxiety, and computer playfulness, which account for up to 60% variance in perceived ease of use. As earlier iterated, this result is essential because it demonstrates that PEOU is strongly linked to general beliefs about computers that are system-independent. Furthermore, it provides a powerful explanation for system acceptance/resistance in cases where there is an absence of any direct system experience. In such cases, one's *"computer-related abilities and knowledge can be expected to serve as the basis for an individual's judgement about how easy or difficult a new system will be to use"* (Venkatesh, 2000, p. 347).

Moreover, research has shown that the relationship between CSE and PEOU is not restricted to only general computer self-efficacy. In fact, in a study by Agarwal, Sambamurthy, and Stair (2000), a model was presented that observed the relationships between both general CSE and application-specific CSE with PEOU. The results demonstrated that the relationship between specific CSE and ease of use ($\beta = .428$) was stronger than that between general CSE and ease of use ($\beta = .198$). This indicates that users perceive the system easier to use when their self-

perceptions of efficacy with regard to the target system are higher, and that application-specific CSE is a more powerful determinant of ease of use than general CSE (Hwang and Yi, 2002).

While the relationship between CSE and behavioral intention to use IT has been established, insight is required regarding the antecedents of CSE. Specifically, what influences individuals to demonstrate low versus high CSE? As these antecedents, by extension, also relate to IT use, their investigation is warranted. Thus, the drivers behind one's CSE will be discussed in the next section.

Antecedents of CSE: An understanding of the antecedents of CSE can be developed by examining the theory from which it was derived, Social Cognitive Theory. A benefit of SCT over all other perspectives of IT use is its notion of triadic reciprocity. While all other theories of IT use view the causal relationships as unidirectional, with the environment influencing cognitive beliefs, which influence attitudes and behaviors, SCT acknowledges a more complex interaction (Compeau et al., 1999).

As shown previously in *Figure 1.4*, SCT advocates the existence of a continuous reciprocal interaction between the environment in which an individual operates, his/her internal personal factors in the form of cognitive, affective and biological events, and behavior (Bandura, 1986). In terms of IT use, an individual's CSE can both influence IT use, as well as be influenced by the individual's environment. Therefore, successful interactions with the technology (e.g., enactive mastery), and positive environmental cues can positively influence one's CSE (Compeau et al., 1999). This allows for the development of capabilities and confidence over time, and also provides reasoning behind often-expensive training

programs. Furthermore, SCT postulates that *"psychological procedures, whatever their form, serve as means of creating and strengthening expectations of personal efficacy"* (Bandura, 1977), thus giving credence to the idea that one's personality can also influence self-efficacy. These factors can influence what actions to take, how much effort to invest, how long to persevere, and what strategies to use in the face of challenging situations (Hwang and Yi, 2002).

Aside from the four main influences on self-efficacy as proposed by social cognitive theory, information systems research has uncovered several other influencing factors on CSE itself. Marakas et al. (1998) summarized these antecedents into 12 categories: enactive mastery, task characteristics, perceived effort, situation support, degree/quality of feedback, emotional arousal, vicarious experience, verbal persuasions, assigned goals/anchors, degree of professional orientation, age, and attribution of cause. Thus, according to research, computer self-efficacy is determined by numerous factors, some of which relate to a person's environment (e.g., situation support, verbal persuasions), while others are personally related to the individual (e.g., emotional arousal, age, degree of professional orientation). In the present study, an emphasis will be placed on the individual related factors that help shape one's CSE.

Individual Differences as Antecedents to CSE: During the 1990's there was a renewed interest in the influence of individual differences on the diffusion of information technology in the workplace, and interest in how these different types of individual differences are inter-related (Thatcher and Perrewe, 2002). In particular, there are two major forms of individual differences: stable and dynamic. Dynamic individual differences, which includes CSE, differ from stable ones in that

training incentives, or other environmental factors may diminish or increase their influence on behavior over time (Ghiselli, Campbell, and Zedeck, 1981). This is in keeping with the literature discussed earlier regarding social cognitive theory and the triadic reciprocity, wherein personal factors, the environment, and behavior all interact and influence one another.

A distinction is also made between two types of stable traits: 1) **broad stable traits**, and 2) **situation-specific stable traits**. Primarily, broad stable traits are enduring and predispose individuals to respond consistently to stimuli *across situations*. Meanwhile, situation-specific stable traits are enduring and predispose individuals to respond to stimuli in a consistent manner *within a narrowly defined context* (Thatcher and Perrewe, 2002).

In terms of how different forms of individual differences interact, there is evidence that the various forms do indeed exert influence on each other. For instance, earlier studies have demonstrated that broad stable traits, such as neuroticism (Watson and Clark, 1984) and innovativeness (Goldsmith and Hofaker, 1991), are linked to dynamic individual differences, such as situation specific self-efficacy. In another study, one particular situation-specific individual trait, personal innovativeness in information technology (PIIT), the willingness of an individual to try out any new information technology, is shown to be related to CSE (Agarwal and Prasad, 1998). Agarwal and Prasad's (1998) findings demonstrate that individuals high in PIIT were more likely to seek out stimulating experiences, and exhibited more confidence in their capacity to use a new IT.

More recently, Thatcher and Perrewe (2002) examined the pattern of relationships among dynamic, IT-specific individual differences (such as computer self-efficacy and computer anxiety), situation-specific traits (i.e., PIIT) and stable

broad traits (i.e., trait anxiety and negative affectivity). They found that situation-specific traits exert a more pervasive influence on IT situation-specific individual differences such as CSE. In other words, PIIT was shown to have a significant direct effect on CSE, whereas trait anxiety and negative affectivity did not. Nevertheless, the authors point out that this does not mean that stable, broad traits are irrelevant to the understanding of CSE. In fact, they underline that in order to gain a better understanding of the role of personality in IT, future research is needed to examine how different stable traits, both broad and situation-specific, relate to constructs such as CSE that influence eventual IT use. This is also important given the debate over whether broad traits can shed light on domain-specific individual differences (such as CSE). Finding that broad traits do influence CSE, and furthermore IT acceptance, would therefore be notable not only in MIS literature, but also in the discussion on the interaction between stable and dynamic individual differences. Furthermore, in the context of IT adoption and use, stable individual traits can serve as identifiers; distinguishing between individuals with potentially low CSE versus those with high CSE.

In light of previous findings, where links have been found between certain stable traits and CSE, it is logical to question whether an even larger range of stable individual differences will influence CSE. As such, the next section will focus on the notion of personality and the Five-Factor model of personality in particular. Furthermore, the potential relationship between the five factors of personality and CSE will be examined.

1.3 - PERSONALITY TRAITS

Primarily, what is “**personality**”? According to Hogan (1991), “*personality from the observer’s perspective concerns the categories or units that we use to sort, classify, perceive, and describe other people*” (p. 877). The field of personality psychology is concerned with individual differences and personality research is the study of how individuals differ in their perceptions and how these differences relate to those individuals’ total functioning. While personality psychology encompasses several theories and approaches, of present interest is its **trait approach**, whose basic point of view is that people possess *broad predispositions*, called traits, to respond in particular ways (Pervin and John, 1997). In the present study, it is the role that individual traits play in eventual IT adoption that is under investigation.

1.3.1 - The Five Factor Model of Personality

Although the study of personality has been ongoing for hundreds of years, it was Sir Francis Galton, in the late eighteen hundreds, who first identified that most of the important individual differences in human transactions could be represented by single terms (Goldberg, 1990). However, for many years personality psychology lacked a descriptive model, or taxonomy, of traits. The goal of a taxonomy, is “*the definition of overarching domains within which large numbers of specific instances can be understood in a simplified way*” (John and Srivastava, 1999, p. 102), thus permitting researchers to study specified domains of personality characteristics, rather than having to study thousands of individual personality traits. In addition, by offering a standard vocabulary, a well accepted taxonomy would also facilitate the accumulation and communication of empirical findings (John and Srivastava, 1999).

The formation of personality taxonomies began in the early 1900's with attempts by Klages (1926), Baumgarten (1933), and Allport and Odbert (1936). This early work was based on the "*lexical hypothesis*" which asserts that most of the socially relevant, and important, personality characteristics have become encoded in the natural language. Thus, researchers began by extracting all personality-relevant terms from the dictionary.

Allport and Odbert's (1936) lexical study of the personality-relevant terms in an unabridged English dictionary is particularly salient because it was later adopted and refined by other researchers. Their work consisted of identifying four major categories of person descriptors, including 1) *personality traits* (stable modes of an individual's adjustment to his environment), 2) *temporary states, moods, and activities* (e.g., afraid, elated), 3) *highly evaluative judgements of personal conduct and reputation* (e.g., excellent, average), and 4) *physical characteristics, capacities and talents*. Cattell (1943) later adopted the Allport and Odbert (1936) list of personality traits as a starting point for his multidimensional model of personality structure. He first narrowed down the number of traits to 4,500 (from a staggering 18,000 terms), and then to merely 35 variables. Eventually, Cattell identified 12 personality factors that were later integrated into his 16 Personality Factors questionnaire (Cattell, Eber, and Tatsuoka, 1970).

Fiske (1949), as well as Tupes and Christal (1961), found the more complex taxonomies to be unnecessary and developed early versions of the five-factor model (FFM). In their study, Tupes and Christal (1961) analyzed correlation matrices from eight different samples, (including ratings by peers, supervisors, teachers or experienced clinicians), and found five relatively strong and recurrent factors which they labeled surgency, emotional stability, agreeableness, dependability and culture.

Researchers have replicated and extensively studied the five-factor structure (Norman, 1963; Borgatta, 1964; Digman and Takemoto-Chock, 1981; Goldberg, 1990, 1992). Norman's (1963) work is particularly significant because his labels of extraversion, emotional stability (the reverse of neuroticism), agreeableness, conscientiousness, and culture (also known as openness) are commonly used in contemporary literature.

The lexical approach to finding and naming the major factors eventually merged with studies relying on questionnaire-based empirical findings. Joint factor analyses of questionnaires developed by different investigators had shown that two broad dimensions in particular, extraversion and neuroticism, appeared in one form or another in most personality inventories (John and Srivastava, 1999). Later, Costa and McCrae (1985), deriving from Cattell's work, developed the NEO Personality Inventory to measure three broad personality dimensions: neuroticism, extraversion, and openness to experience. They later extended their model with preliminary scales measuring agreeableness and conscientiousness, and demonstrated in several studies (McCrae and Costa, 1985a, 1985b, 1987) that their five scales converged with adjective-based measures of these five factors.

Today, although there still remains an ongoing debate over the exact terminology of the five factors, they are most commonly called **neuroticism, extraversion, openness, conscientiousness, and agreeableness** (Costa and McCrae, 1992), and will be referred to as such in this paper. The five factors are also known as the "Big Five" (Goldberg, 1981), a term that emphasizes the broad nature of each factor. According to John and Srivastava (1999), *"these five dimensions represent personality at the broadest level of abstraction, and each dimension summarizes a large number of distinct, more specific personality characteristics"*

(p.105). Table 1.1 presents the five factors and the characteristics that are associated with each broad trait.

Since the mid nineteen-eighties, research has accumulated which provides compelling evidence for the robustness of the five-factor model (Barrick and Mount, 1991). In fact, the five-factor structure has been generalized across measures, cultures, and sources of ratings (McCrae and John, 1992). As for the stability of personality traits, Costa and McCrae (1988) studied this issue in a six-year longitudinal study. Using their NEO Personality Inventory instrument, they noted retest correlation for neuroticism, extraversion, and openness of .83, .82, and .83, respectively. These values approach the reliabilities of the scales themselves, and thus demonstrate that many personality traits are indeed quite stable.

FFM in the Organizational Context: Although early studies on personality as a predictor of organizational variables demonstrated low validity, they came at a time when no well-accepted taxonomy for classifying personality traits existed (Barrick and Mount, 1991). However, with the great strides that have been made in the past two decades, it is believed that applied psychologists can and subsequently have taken advantage of this information in ways that have significant consequences for employee development and organizational effectiveness (Hogan, 1991).

Table 1.1: The Big Five Trait Factors and Illustrative Scales

| CHARACTERISTICS OF THE HIGH SCORER | TRAIT SCALES | CHARACTERISTICS OF THE LOW SCORER |
|---|---|---|
| Worrying, nervous, emotional, insecure, inadequate, hypochondriacal | <p align="center">NEUROTICISM (N)</p> <p>Assesses adjustment vs. emotional instability. Identifies individuals prone to psychological distress, unrealistic ideas, excessive cravings or urges, and maladaptive coping responses.</p> | Calm, relaxed, unemotional, hardy, secure, self-satisfied |
| Sociable, active, talkative, person-oriented, optimistic, fun-loving, affectionate | <p align="center">EXTRAVERSION (E)</p> <p>Assesses quantity and intensity of interpersonal interaction; activity level; need for stimulation; and capacity for joy.</p> | Reserved, sober, unexuberant, aloof, task-oriented, retiring, quiet |
| Curious, broad interests, creative, original, imaginative, untraditional | <p align="center">OPENNESS (O)</p> <p>Assesses proactive seeking and appreciation of experience for its own sake; toleration for and exploration of the unfamiliar.</p> | Conventional, down-to-earth, narrow interests, unartistic, unanalytical |
| Organized, reliable, hard-working, self-disciplined, punctual, scrupulous, neat, ambitious, persevering | <p align="center">CONSCIENTIOUSNESS (C)</p> <p>Assesses the individual's degree of organization, persistence, and motivation in goal-directed behavior. Contrasts dependable, fastidious people with those who are lackadaisical and sloppy.</p> | Aimless, unreliable, lazy, careless, lax, negligent, weak-willed, hedonistic. |
| Soft-hearted, good-natured, trusting, helpful, forgiving, gullible, straightforward | <p align="center">AGREEABLENESS (A)</p> <p>Assesses the quality of one's interpersonal orientation along a continuum from compassion to antagonism in thoughts, feelings, and actions.</p> | Cynical, rude, suspicious, uncooperative, vengeful, ruthless, irritable, manipulative |

Source: Personality Theory and Research – Seventh Edition (Pervin and John, 1997, p. 259) – Based on the work by Costa and McCrae (1985).

Indeed, once researchers converged upon the FFM in the 1990's as the premiere framework of personality, several relationships between personality and organizational behavior variables were uncovered. For instance, Barrick and Mount (1991) investigated the relationship between the FFM and three job performance criteria (job proficiency, training proficiency, and personnel data) for five occupational groups (professionals, police, managers, sales, and skilled/semi-skilled). Among their findings, conscientiousness showed consistent relationships with all job performance criteria for all occupational groups. In addition, extraversion was a valid performance predictor for occupations involving social interaction. In other studies, it has been found that neuroticism, extraversion, and conscientiousness display fairly significant correlations with job satisfaction (Judge, Heller, and Mount, 2002). Relationships between the FFM and performance motivation (Judge and Ilies, 2002), and leadership (Judge et al., 2002; Taggar, 1999) have also been found.

In terms of information technology, very little research has employed the five-factor model. Only in a recent study, was the FFM used in relation to the examination of psychological antecedents of institution-based consumer trust in e-retailing (Walczuch and Lundgren, 2004). However, this study failed to find any influence of personality on institution-based trust in online retailing.

FFM and Self-Efficacy: Research on individual differences has, as discussed earlier, distinguished between stable (i.e., personality traits) and dynamic individual (e.g., self-efficacy) differences. These two categories can also be termed trait-like individual differences and state-like individual differences (Chen, Gully, Whiteman, and Kilcullen, 2000). Trait-like differences such as personality characteristics are

not task-specific and are said to be stable over time (Ackerman and Humphreys, 1990; Hough and Schneider, 1996). Meanwhile, state-like differences such as task-specific self-efficacy are situation-specific and tend to be malleable over time (Bandura, 1997; Gist and Mitchell, 1992). The relationships of trait-like constructs, such as cognitive ability, with performance have been shown to be indirect, through state-like constructs, such as specific self-efficacy (Chen et al., 2000). Bandura (1997) also suggests that individual personality exerts an indirect influence on performance via its effect on self-efficacy.

Wooten's results (1991) suggest that personality traits significantly affect subjects' self-efficacy for job acceptance behavior. As well, Thoms, Moore, and Scott (1996) examined the relationship of the Big Five personality dimensions to self-efficacy for participating in self-managed work groups, and found that neuroticism, extraversion, and conscientiousness were all significantly related with self-efficacy. In terms of training, Colquitt and Simmering (1998) showed that conscientious learners had higher self-efficacy and a stronger desire to learn training content. Cozzarelli (1993) found that self-efficacy mediated the relationship between personality variables and coping with abortion.

FFM and Computer Self-Efficacy: The above discussion on computer self-efficacy and the five-factor model have provided insights into each realm of study, and have also presented an opportunity to converge the two concepts and study them in conjunction. The emergence of the five-factor model of personality as a credible tool in psychology and in organizational behavior studies, in addition to a much needed focus on individual differences as they relate to IT adoption and use, give reason for this particular exploration. However, despite some attempts to study

individual characteristics with respect to IT use models such as TAM (e.g., Agarwal and Prasad, 1999), the study of individual characteristics and their effects on choices about technology is still wide open (Dishaw, Strong, and Bandy, 2002). As was discussed, while there has been a wealth of research on the causes of, or antecedents to, CSE, as summarized by Marakas et al. (1998), there is a lack of research examining CSE's relationship with individual characteristics. Furthermore, practically no research has been conducted that focuses on an individual's personality, its influence on CSE, and furthermore its relationship with behavioral intention to use IT. The only personality trait that has been studied in relation to CSE is personal innovativeness in information technology (PIIT) (Agarwal and Prasad, 1998) which is considered a situation-specific stable trait. In terms of the FFM, PIIT is most closely related to the trait called "openness".

Nevertheless, it remains that none of the five traits of neuroticism, extraversion, openness, conscientiousness, or agreeableness has ever been specifically studied in relation to CSE. And, since personality traits are thought to be relatively stable characteristics of individuals that influence cognition and behavior (Kanfer, 1991), their specific study warrants inclusion in the IT use literature. This research is additionally valuable in light of research examining the relationship between stable individual differences such as personality with dynamic individual differences such as computer self-efficacy.

1.4 - CONCLUSION

Despite the abundance of research conducted on CSE, Marakas et al. (1998) concede that there exists room for improvement, and that many antecedents of this construct are still unknown or have not been researched. Of particular interest, they

suggest that there is a need to develop a greater understanding of the differences among individuals with high CSE versus those with low CSE. This understanding is essential in terms of employee training, as high CSE trainees may differ from low CSE trainees in both the type of training method best suited to increasing their performance and the degree to which training is effective.

With the emergence of the Big Five personality traits as a credible tool in organizational behavior studies, it seems logical to extend its usefulness in explaining and predicting IT acceptance. The main question that arises is whether the five personality traits differ in relation to some dependent variable. In this case, the question would be whether neuroticism, extraversion, openness, conscientiousness, and agreeableness differ on measures of computer self-efficacy. Although some of these traits have been shown to differ on other measures of self-efficacy (i.e., self-efficacy for participating in self-managed work groups), their relation to CSE is still unknown.

One way to differentiate between low CSE individuals and high CSE individuals is through the identification of stable personality traits characteristic of each group (Thatcher and Perrewé, 2002). While small strides have been made in this line of research, there definitely remains a dearth of information regarding the relationship between stable individual traits and CSE. Thatcher and Perrewé (2002) recognized this deficiency and stated that future research is needed to examine the role of stable personality traits in IT acceptance. The present study thus aims at answering the following question: Are stable individual differences related to individuals' perceptions of their capabilities to use information technology? In other words, are individual levels of neuroticism, extraversion, openness, conscientiousness, and agreeableness related to individual levels of computer self-

efficacy, and ultimately to an individual's behavioral intention to use IT? Based on the literature discussed above, the research model and related hypotheses will be presented in chapter 2.

CHAPTER 2: RESEARCH MODEL AND HYPOTHESES

The current chapter introduces the research model that has been developed based on the literature discussed in the previous chapter. Furthermore, the hypothesized relationships between personality traits, computer self-efficacy, perceived ease of use, and behavioral intention to use IT are presented.

Management Information Systems has seen the emergence of several models attempting to explain individual acceptance of IT, including several intention-based models, such as TRA and TPB. Intention to use new IT is considered to be highly related with actual usage, and has been employed in several research studies (e.g., Hill et al., 1987; Mathieson 1991; Taylor and Todd 1995; Venkatesh and Davis 1996). Research has shown that an individual's intention to use a technology can be influenced by several factors, including perceived ease of use and perceived usefulness (Davis 1989), as well as one's computer self-efficacy (Compeau and Higgins, 1995; Hill et al., 1987).

Since MIS research has not examined this particular relationship in detail, the following question arises: Are stable personality traits, such as those included in the Five-Factor Model of personality related to one's computer self-efficacy? This question forms the basis of this study, and is central to the research model and hypotheses presented in this chapter.

2.1 - THE RESEARCH MODEL

In chapter one several key concepts that have been previously employed by other researchers were introduced. These concepts, that have been prevalent in either MIS or psychology literature for several years, include: behavioral intention to

use new technology, computer self-efficacy, and the five-factor model of personality.

In the present research model (Figure 2.1), there are five independent variables: the five personality traits of neuroticism, extraversion, openness, conscientiousness, and agreeableness that are expected to be related to one's computer self-efficacy.

Perceived ease of use can be viewed as a mediator variable between CSE and behavioral intention to use new IT (Venkatesh and Davis, 1996). Although CSE has been shown to influence technology acceptance directly (Hill et al., 1987; Venkatesh et al., 2003), conflicting evidence suggests that perceived ease of use fully mediates CSE's influence on behavioral intention. Therefore, in order to assess the influence of CSE effect on behavioral intention, perceived ease of use is included as a mediating variable in the model.

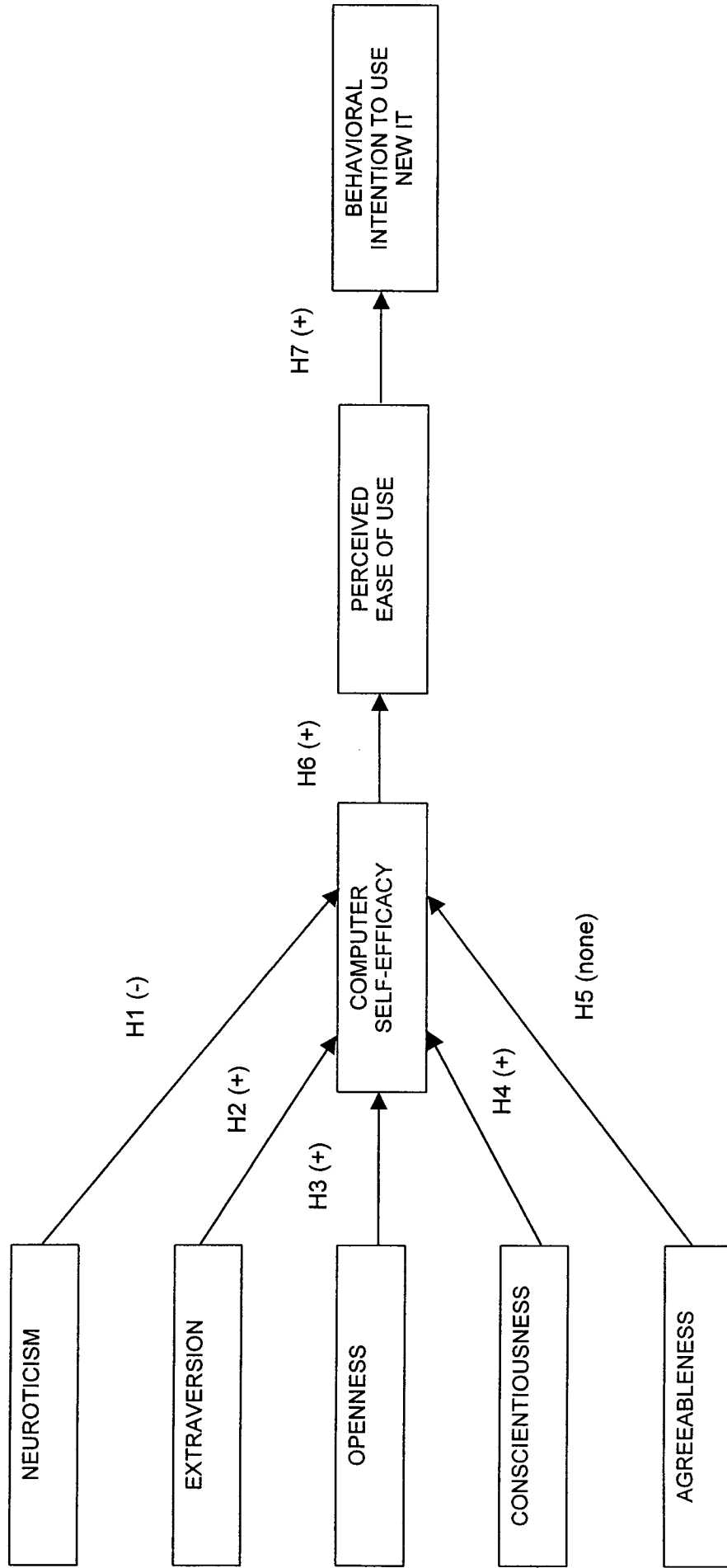


Figure 2.1: The Research Model

2.2 - RESEARCH HYPOTHESES

2.2.1 - The Five-Factor Model of Personality and Computer Self-Efficacy

Neuroticism: There is general agreement in the literature about the dimension of neuroticism, (also called emotional stability, which is the opposite end of the spectrum) (Barrick and Mount, 1991). Neuroticism is the most pervasive trait across personality measures as it is prominent in nearly every measure of personality (Judge et al., 1999). The dimension is anchored at one end by words such as *nervous*, *self-doubting*, and *moody*, and at the other end by words like *stable*, *confident*, and *effective* (Hogan, 1991). Neuroticism can be broken down into six facets: anxiety, hostility, depression, self-consciousness, vulnerability, and impulsiveness (Costa and McCrae, 1992). Individuals high on neuroticism are limited in social skills and avoid situations that demand taking control (Judge, Locke, and Durham, 1997). Individuals high on neuroticism also feel that they have no control in life situations (Walczuch and Lundgren, 2004). In previous research, high neuroticism has been related to low self-efficacy (Thoms et al., 1996). As such, the following hypothesis can be made:

H1: Neuroticism is negatively related to computer self-efficacy.

Extraversion: There is also wide agreement on the dimension termed extraversion (Barrick and Mount, 1991). Extraversion is a prominent factor in personality psychology as evidenced by its appearance in most personality measures, and its important role in major taxonomies of personality (even those preceding the FFM) (Judge, Higgins, Thoresen, and Barrick, 1999). Extraversion is characterized at one end by terms such as *gregarious*, *energetic*, and *self-*

dramatizing and at the other by such terms as *shy*, *unassertive*, and *withdrawn* (Hogan, 1991). Hogan (1986) has interpreted this dimension as consisting of two components, ambition (initiative, ambition, and impetuous), and sociability (sociable, exhibitionist, and expressive). Extraverts have a high desire for social recognition, praise, status, exhibition, and power (Costa and McCrae, 1988). In addition, extraverts are more likely to take on leadership roles (Watson and Clark, 1997) and are quicker to adapt to change (Walczuch and Lundgren, 2004). Extraverts are also more assertive, energetic, and sociable. Previously, it was found that extraversion was positively related to self-efficacy (Thoms et al., 1996). Research has also shown that extraverts (or Type A personalities) have higher levels of arousal than other personality types resulting in higher levels of self-efficacy (Taylor et al., 1984). Thus, it can be hypothesized that:

H2: Extraversion is positively related to computer self-efficacy.

Openness: This dimension has been the most difficult to identify, as it has been called *intellect*, *culture*, and *openness*, and most probably inhabits all these traits (Barrick and Mount, 1991). Openness is characterized as *imaginative*, *curious*, *open-mindedness* and *original* at one end, and as *dull*, *unimaginative*, and *literal-minded* at the other end (Hogan, 1991). Individuals high on openness can be scientifically and artistically creative (Feist, 1998), divergent thinkers, and politically liberal (McCrae, 1996). More openness leads to more willingness to embrace new concepts and to be more careless with respect to new situations and experiences (Walczuch and Lundgren, 2004). Openness is also the factor that most closely relates to the situation-specific stable trait of personal innovativeness in information

technology (PIIT), which has been shown as a predictor of CSE (Thatcher and Perrewe, 2002). Although previous research showed no relation between openness and self-efficacy (for participating in self-managed work groups) (Thoms et al., 1996), openness has been found to be a valid predictor of training proficiency (Barrick and Mount, 1991). It is theorized that individuals who score high on this dimension are more likely to have positive attitudes towards learning experiences in general. It is therefore possible that individuals who score high on openness may also be more willing to learn to use new IT, and may be less apprehensive about the new technology. Therefore,

H3: Openness is positively related to computer self-efficacy.

Conscientiousness: Generally, the dimension of conscientiousness is characterized by terms such as *planful*, *neat*, and *dependable* at one end, and *impulsive*, *careless*, and *irresponsible* at the other end (Hogan, 1991). The construct is manifested in three related facets: achievement orientation (hardworking and persistent), dependability (responsible and careful), and orderliness (planful and organized). Thus, conscientiousness is related to an individual's degree of self-control, as well as need for achievement, order and persistence (Costa, McCrae, and Dye, 1991). Barrick and Mount (1991) found that conscientiousness was a valid predictor of performance across all occupational groups and job-related criterion types examined. In addition, Thoms et al. (1996) found conscientiousness to be positively related to self-efficacy for self-managed work groups. Thus,

H4: Conscientiousness is positively related to computer self-efficacy.

Agreeableness: The last dimension is generally agreeableness, which is marked at one end by words such as *warm, tactful, and considerate*, and at the other by terms such as *independent, cold, and rude* (Hogan, 1991). According to Organ and Lingl (1995), agreeableness involves getting along with others in pleasant, satisfying relationships. Costa and McCrae (1992) suggest that agreeable individuals are altruistic, sympathetic, and eager to help others. Meanwhile, Goldberg (1992) found agreeableness to be associated with tendencies toward kindness, unselfishness, generosity and fairness. Individuals scoring low on agreeableness have little respect for other's interests and well-being and are less concerned with social norms (Walczuch and Lundgren, 2004). Past research has shown that agreeableness is not an important factor for either job performance (Barrick and Mount, 1991) or self-efficacy for participating in self-managed work groups (Thoms et al., 1996). Thus, there is no reason to believe that agreeableness will have any effect on one's computer self-efficacy. Therefore,

H5: Agreeableness is not related to computer self-efficacy.

It is important to note that although no relation is predicted between agreeableness and CSE, it is still considered relevant to keep the personality trait in the model. Since, the five-factor model has never been studied in this context, and has been studied only rarely with respect to self-efficacy of any kind, and because of the exploratory nature of the present study, it is still possible that an unexpected relationship emerges.

2.2.2 - Computer Self-Efficacy and Perceived Ease of Use

Although there has been evidence that computer self-efficacy is directly related to behavioral intention to use IT, there exists much more compelling evidence that the effect of CSE is mediated through perceived ease of use (Venkatesh and Davis, 1996; Venkatesh, 2000). Research has shown a causal flow from computer self-efficacy to system-specific perceived ease of use (Venkatesh and Davis, 1996), in that an individual's perception of a particular system's ease of use is anchored to her or his general CSE at all times. Furthermore, it was reasoned that *"in the absence of direct system experience, the confidence in one's computer-related abilities and knowledge can be expected to serve as the basis for an individual's judgement about how easy or difficult a new system will be to use"* (Venkatesh, 2000; p. 347). Moreover, research has shown that the relationship between CSE and PEOU is stronger when examining application-specific CSE as opposed to general CSE (Agarwal et al., 2000). In the present study, system-specific CSE will be investigated, and therefore it is hypothesized that:

H6: Computer self-efficacy is positively related to perceived ease of use.

2.2.3 - Perceived Ease of Use and Behavioral Intention

The last hypothesis that will be tested is the relationship between PEOU and the behavioral intention to use a new IT. The relationship between PEOU and behavioral intention was developed through the TAM model (Davis, 1989), as discussed in chapter one. TAM has been supported by a great number of validations, applications, and replications (Adams et al., 1992; Chin and Gopal, 1993; Chin and Todd, 1995; Davis, 1993; Davis and Venkatesh, 1996; Gefen and

Straub, 1997; Hendrickson et al., 1993; Igbaria et al., 1997; Mathieson, 1991; Segars and Grover, 1993; Subramanian, 1994; Szajina, 1994, 1996; Taylor and Todd, 1995; Venkatesh, 1999; Venkatesh and Davis, 1996; Venkatesh and Morris, 2000). It has been demonstrated that individuals are more likely to interact with new IT if they perceive that relatively little cognitive effort will be expended during the interaction (Adams et al., 1992). Therefore,

H7: Perceived ease of use is positively related to behavioral intention to use new IT.

The following chapter presents the research method and context, the means by which data was collected, and the measures utilized.

CHAPTER 3: RESEARCH METHODOLOGY

The present chapter discusses the setting employed to examine the research hypotheses proposed in the previous chapter. The research measures utilized are also examined. In addition, the procedure used to collect data is outlined.

3.1 - RESEARCH SETTING

The current research employed a cross-sectional web-based survey to examine non-users behavioral intention to use Concordia University's library Self-Checkout system. The Concordia library has implemented several new technologies over the years to better service its patrons, including library search technologies and the Self-Checkout system. A proposal, presented in Appendix A (p.95), outlining the desire to study the Self-Checkout system was sent to Mr. Jean-Marc Edwards, the Assistant Director (Systems) of the Concordia University Libraries who agreed to provide information regarding the system.

The Self-Checkout system was implemented at Concordia University a few years prior to this study, and is available to all students and faculty members. The system is available on both Concordia University campuses, at the Webster library located on the Sir George Williams campus in downtown Montreal and at the Vanier library located on the Loyola campus in Montreal. This system allows library users to check out materials by themselves using their ID card and a PIN# that can be obtained online through the web-based library's CLUES system. To check out a book, users of the Self-Checkout system must follow a step-by-step process that is conveyed on a monitor. Once a user has completed checkout, he/she will get a receipt indicating the date of return. The Self-Checkout system is located on the same floor as the in-person checkout, and offers an alternative to library patrons.

Though available for some time, the Self-Checkout system has never been publicized to its patrons at large, and system usage is completely voluntary. As such, many graduate students and faculty members questioned before the initiation of this research were unaware of the system's existence. Therefore, this study focuses on the non-users of the Self-Checkout system.

3.2 - CONSTRUCTS OPERATIONALIZATION AND MEASURES

3.2.1 - The Five-Factor Model of Personality

The Big Five personality traits of neuroticism, extraversion, openness, conscientiousness, and agreeableness were measured using the 44-item Big Five Inventory (John, Donahue, and Kentle, 1991). The instrument, presented in Appendix B (p.100), is one of the most widely used measures of the Big Five personality dimensions. Neuroticism and extraversion were each measured with 8 items; conscientiousness and agreeableness with 9 items each; and openness with 10 items. Reported mean reliabilities are .85 for neuroticism, .87 for extraversion, .81 for openness, .85 for conscientiousness, and .83 for agreeableness (John and Srivastava, 1999). All items were coded on a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). All questions begin with the statement "I see myself as someone who...", and continue with characterizations such as: "is depressed, blue" (neuroticism), "is talkative" (extraversion), "is original, comes up with new ideas" (openness), "does a thorough job" (conscientiousness), "is helpful and unselfish with others" (agreeableness).

3.2.2 - Computer Self-Efficacy

System-specific computer self-efficacy, operationalized as the respondent's judgement of his/her capability to use the Self-Checkout system, was measured with 10 items, on a 10-points Likert scale ranging from Not confident at all (1) to Totally confident (10) developed and validated by Compeau and Higgins (1995b). The questions were adapted to focus on one's CSE with regard to the library Self-Checkout system in particular. The instrument is presented in Appendix B (p.101).

3.3.3 - Perceived Ease of Use

PEOU, the degree to which a person believes that the system's use would be free of effort, was assessed using a 6 items measure, on a 7-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (7) developed by Davis (1989) and shown in Appendix B (p.101).

3.3.4 - Behavioral Intention to Use New Technology

Behavioral intention to use the Self-Checkout system, or the strength of one's intention to use the system, was measured using 5-items on 7-point Likert scales ranging from Strongly Disagree (1) to Strongly Agree (7). Similar items were previously used by Chau and Hu (2002) and Venkatesh et al. (2003). The measure, shown in Appendix B (p.101), was adapted to refer to the Self-Checkout system.

A summary of the measures utilized in the current study is presented in Table 3.1.

Table 3.1: Summary of Measures

| Construct | No. of Items | Scale | Source |
|------------------|---------------------|--------------|---|
| EFM | 44 | 1-5 | John, Kentle, and Donahue (1991) |
| CSE | 10 | 1-10 | Compeau and Higgins (1995b) |
| PEOU | 6 | 1-7 | Davis (1989) |
| BI | 5 | 1-7 | Chau and Hu (2002); Venkatesh et al. (2003) |

3.3.5 - Demographics

In addition to the previous items, respondents were also questioned on four demographic aspects: age, gender, faculty (Arts and Sciences, John Molson School of Business, Engineering and Computer Science, or Fine Arts), and on their status, whether the respondent was a graduate student or a faculty member.

3.4 - WEB-SURVEY DESIGN

Since all graduate students and faculty members are provided with an email address by the university, and/or can be reached by the university at a email address of their choice, it was decided to rely on a web-survey for the collection of data. The web-survey was created on a survey hosting web-site called *SurveyMonkey.com* that enables users to create professional online surveys. The design process took approximately three weeks to complete, taking into consideration color schemes, layout, the exact wording of each question, and the order in which the questions would be presented.

3.5 - PRE-TESTING PHASE

Once the web-survey was completely designed and functional, a pre-testing phase was initiated. An email, presented in Appendix C (p.102), containing the link to the web-survey was sent to 10 individuals who were familiar with the Concordia University Library (4 faculty members, and 6 graduate students). This phase was conducted prior to the data collection phase in order to determine whether the participants were satisfied with the web-survey and able to interpret questions as intended. These individuals were instructed to offer their constructive criticism regarding the following: the color scheme of the web-survey, the wording of each question, the description of the Self-Checkout system as presented in the survey, and any other facet of the survey that they found odd or felt could be improved.

Seven of these 10 individuals responded to the pre-test. Subsequent changes were made to the color scheme and to the description of the Self-Checkout system. Two additional behavioral intention items from Chau and Hu (2002) were also included, on top of the three items from Venkatesh et al. (2003) already in the survey. Wording of certain questions was also adjusted in order to increase understandability. Following these adjustments the web-survey, presented in Appendix D (p.104), was fully completed and finalized. The first two pages of the web-survey comprised two filter items, which questioned respondents on whether they borrowed books from the library and whether they used the Self-Checkout system. The respondents who answered that they had never used the system were then presented with the CSE items, followed by the PEOU items on the next screen, and then the behavioral intention items. The items assessing the five-factor model of personality were spread over the next three screens. Finally, the last page comprised questions regarding demographics.

3.6 - DATA COLLECTION

The sample for this study consisted of Concordia University faculty members and graduate students. Research access was gained through communications with department administrations during July and August 2004. Each program and academic department was sent an email, shown in Appendix E (p.115), to inquire whether administrators were either willing to forward the information onto the faculty or students in their department, or were willing to provide the researcher with the email addresses of potential participants to enable direct contact. In other cases, the administrators opted to post information regarding the web-survey on their department's online message board.

Faculty members who were contacted were from the university's four faculties. Access was granted to graduate students in the following departments: Administration, Art History, Aerospace Engineering, Business Administration, Communication Studies, Economics, Education, Electrical and Computer Engineering, Geography/Planning/Environmental Studies, Mathematics and Statistics, Psychology, and Religion.

In total, approximately 3080 potential participants (2226 graduate students and 854 faculty members) were either directly informed of the study or had access to the web-survey through their department's message board or mail folder. Each potential participant was informed of the study via an email cover letter, presented in Appendix F (118), which explained the purpose of the study, assured respondents of anonymity, and underlined that participation in the study was

completely voluntary. Within this cover letter, individuals were provided with a web-link for the survey.¹

Mailing lists were created for all graduate students and faculty members whose direct contact information had been obtained (749 individuals in total). A mailing list was also created for all the department administrators who had agreed to distribute the survey to the graduate students and or faculty members in their departments (12 administrations in total). Due to the large number of potential respondents, the cover letter email was sent out in batches over a one-week period (October 18 to 26, 2004), so as to avoid any problems related to heavy traffic on the web-site. A potential of 400 individuals were contacted per day. The exact number of individuals can not be reported as many were contacted indirectly through their departments.

As of October 28, 2004, 231 respondents had completed the questionnaire, 108 of which had never used the Self-Checkout system. Beginning on October 28, 2004 individuals were sent another email, shown in Appendix G (p.121), which served as both a thank you letter for all those who had already responded to the survey, and as a reminder letter for all those who had not yet responded. Due to the fact that respondents were untraceable and anonymous it was impossible to send separate thank you and reminder emails. The batches were sent in the same manner as the original email, keeping in mind the dates on which individuals had received the original email. This process was completed on November 6th, 2004. Responses were accepted for another 10 business days, after which the survey was no longer available online.

¹ <http://www.surveymonkey.com/s.asp?u=87086578619> (note: the web-survey has now been closed)

During the data collection period, 6 individuals reported that the reason they did not use the Self-Checkout system was due to the fact that it did not work for them when they attempted. Specifically, these individuals reported that the system would not accurately read their ID cards. All of these individuals were faculty members. The problem was reported to the library IS director.

The next chapter discusses the data analysis process for the results obtained.

CHAPTER 4: DATA ANALYSIS

The current chapter presents information regarding the research sample, as well as the demographic characteristics of respondents. Descriptive statistics for the obtained data are also presented. In addition, the data analysis procedure using structural equation modeling and results are discussed.

4.1 - SAMPLE CHARACTERISTICS

Approximately 3080 individuals received the invitation, either directly or indirectly, to participate in the study. A total of 151 non-users of the Self-Checkout system responded to the survey. As the total number of non-users in the total population can not be estimated, an accurate response rate can not be calculated. Of the 151 respondents, 8 were dropped from the dataset due to a lack of responses on too many items, thereby bringing the sample size down to 143 respondents. As shown in Table 4.1, the final 143 respondents consisted of 100 graduate students and 43 faculty members.

Responses were gathered from individuals across all four of the University's faculties. Specifically, 83 non-users responded from the 1257 individuals contacted in Arts and Sciences; 36 non-users from the 634 individuals in the John Molson School of Business; 18 non-users from the 962 individuals in Engineering and Computer Science; and 6 non-users from the 227 individuals from Fine Arts.

Table 4.1: A Comparison of Total Respondents versus Total Population

| Faculty | No. of Faculty Members | | No. of Grad Students | | Subtotals | |
|--------------------------------|------------------------|-----|----------------------|------|------------|------|
| | Population | | Population | | Population | |
| Arts and Sciences | Population | 400 | Population | 857 | Population | 1257 |
| | Non-users | 32 | Non-users | 51 | Non-users | 83 |
| John Molson School of Business | Population | 159 | Population | 475 | Population | 634 |
| | Non-users | 5 | Non-users | 31 | Non-users | 36 |
| Engineering & Computer Science | Population | 150 | Population | 812 | Population | 962 |
| | Non-users | 3 | Non-users | 15 | Non-users | 18 |
| Fine Arts | Population | 145 | Population | 82 | Population | 227 |
| | Non-users | 3 | Non-users | 3 | Non-users | 6 |
| Subtotals | Population | 854 | Population | 2226 | Population | 3080 |
| | Non-users | 43 | Non-users | 100 | Non-users | 143 |

4.2 - DEMOGRAPHICS

As discussed, respondents include 100 graduate students and 43 faculty members. Broken down by faculty (Figure 4.1), 83 respondents were from Arts and Science (51 grad students, 32 faculty members), 36 from the John Molson School of Business (31 grad students, 5 faculty members), 18 (15 grad students, 3 faculty members) from Engineering and Computer Science, and 6 (3 grad students, 3 faculty members) from Fine Arts.

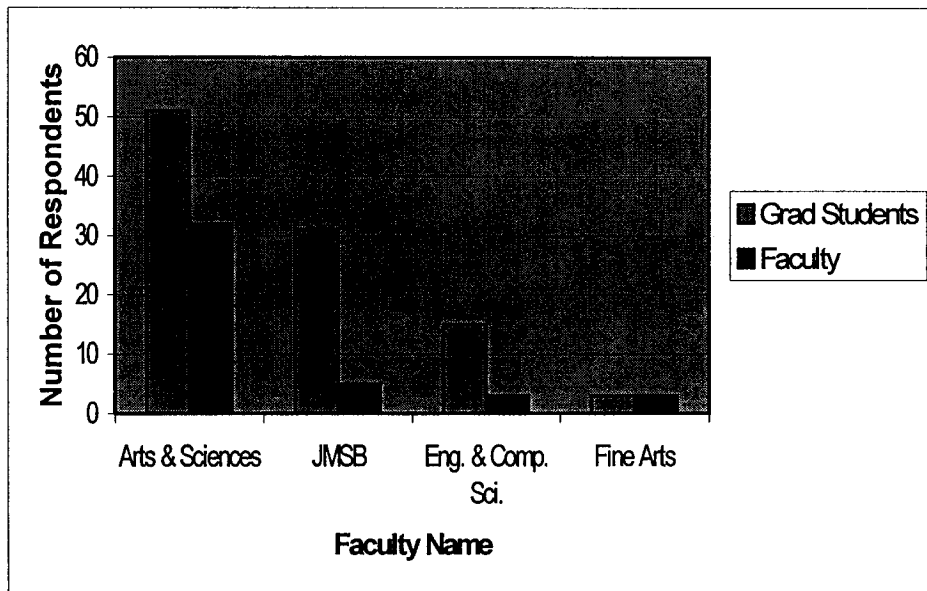


Figure 4.1: Sample of Non-Users by Faculty and Status

As shown in figure 4.2, a total of 77 respondents (63 grad students and 14 faculty members) were female and 67 (37 grad students and 29 faculty members) were male.

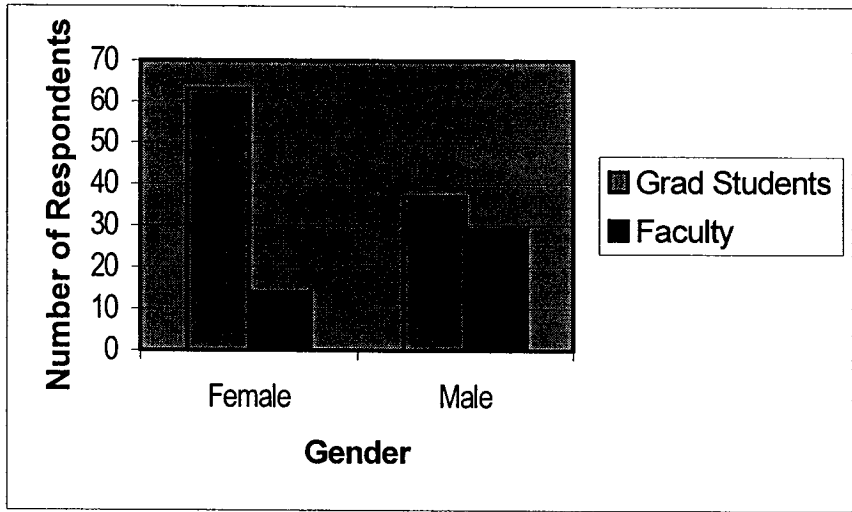


Figure 4.2: Sample of Non-Users by Gender and Status

As shown in figure 4.3, respondents reported their age as follows: 23 respondents (all students) were between 18-25 years of age, 71 (56 grad students and 15 faculty) were between 26-35, 22 (12 faculty and 10 students) were between 36-45, 12 (6 faculty and 6 students) were between 46-55, 12 (7 faculty and 5 students) were between 56-65, and 3 individuals (all faculty) were over 65.

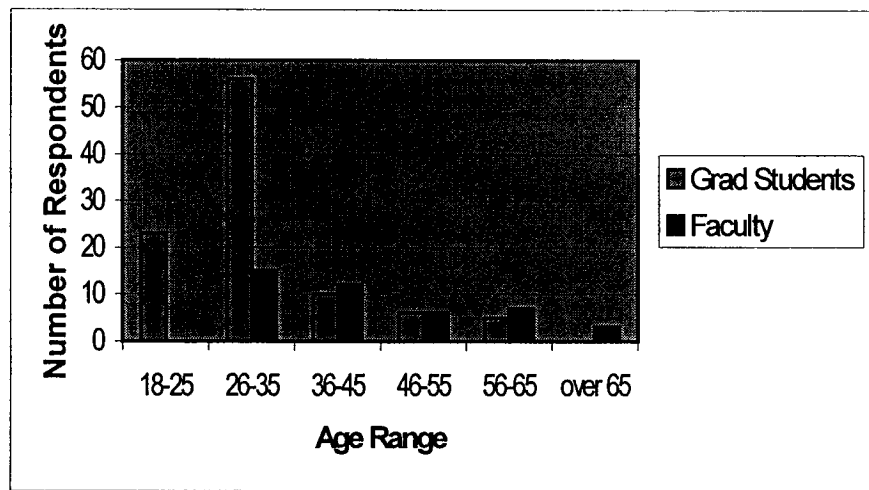


Figure 4.3: Sample of Non-Users by Age and Status

4.3 - DESCRIPTIVE STATISTICS

Prior to analysis, reverse coding was required for a total of 16 items in the Big Five Inventory² (items 2, 6, 8, 9, 12, 18, 21, 23, 24, 27, 31, 34, 35, 37, 41, and 43). Descriptive statistics for the research constructs are shown in Table 4.2. The means that are presented were calculated prior to any removal of items due to reliability analysis.

Table 4.2: Descriptive Statistics

| Construct ³ | No. of Items | Scale | Minimum Recorded Response | Maximum Recorded Response | Item Means | Standard deviation |
|------------------------|--------------|-------|---------------------------|---------------------------|------------|--------------------|
| NEURO | 8 | 1-5 | 1 | 5 | 2.74 | 0.68 |
| EXTRA | 8 | 1-5 | 1 | 5 | 3.49 | 0.77 |
| OPEN | 10 | 1-5 | 1 | 5 | 3.88 | 0.59 |
| CONSC | 9 | 1-5 | 1 | 5 | 3.76 | 0.62 |
| AGREE | 9 | 1-5 | 1 | 5 | 3.85 | 0.60 |
| CSE | 10 | 1-10 | 1 | 10 | 8.07 | 2.02 |
| PEOU | 6 | 1-7 | 1 | 7 | 5.54 | 1.14 |
| BI | 5 | 1-7 | 1 | 7 | 4.66 | 1.76 |

4.4 - STRUCTURAL EQUATION MODELING

Structural equation modeling using the partial least squares (PLS) method was utilized to analyze the hypothesized paths in the research model. PLS is a second-generation multivariate technique permitting the validation of the psychometric properties of the scales used to measure a variable, as well as the strength and direction of the relationships among variables (Cassel, Hackl and Westlund, 1999). PLS uses a component-based approach to estimation and therefore places minimal demands on sample size and does not require a normal

² see Appendix B – Measurement Tools

³ NEURO. = Neuroticism ; EXTRA. = Extraversion; OPEN. = Openness; CONSC. = Conscientiousness; AGREE. = Agreeableness

distribution of the dataset (Lohmoller, 1989; Fornell and Bookstein, 1982; Chin, 1998a). The only requirement is that the sample size be at least ten times larger than the number of items contained in the most substantial construct (Gopal, Bostrom and Chin, 1993; Wold, 1989). In the present study, the most number of items for a particular construct was 10 (CSE). Therefore, the sample size of 143 was large enough for this procedure.

Performing structural equation modeling with PLS requires the completion of two major steps: 1) assessment of the measurement model by investigating both reliability and validity, and 2) assessment of the structural model, which reveals the item loadings and path coefficients measures (Croteau and Bergeron, 2001; Hulland, 1999; Igbaria and Greenhaus, 1992; Thompson, Higgins and Howell, 1991). PLS Graph 2.91 (Chin and Frye, 1995). was the statistical tool utilized for the following analyses.

4.4.1 - Assessment of the Measurement Model

The psychometric properties of the scales are assessed in terms of construct unidimensionality (item reliability) as well as convergent and discriminant validity.

Primarily, **construct unidimensionality** was assessed through factor analysis, a statistical technique that enables the identification of subsets of variables that are correlated with each other but that are relatively uncorrelated with the variables in the other subsets. Items are loaded onto a particular factor, where a higher factor loading demonstrates a stronger association with a factor (Whitley, 2001). The loading of each item must be greater than .50, and furthermore the highest loading for a given item must correspond with the construct it represents.

Next, the validity of a measure refers to the accuracy of measurement, and is assessed in two ways. First, **convergent validity** identifies whether each item measures what it is theoretically designed to measure. It is assessed through the internal consistency reliability estimate, ρ (Rho), of the items belonging to a particular construct. In the present study, internal consistencies greater than 0.70 are considered acceptable. Rho is a composite value calculated using the following formula:

$$\rho = (\sum |\lambda_i|)^2 / (\sum |\lambda_i|^2 + \sum (1-\lambda_i^2)) \text{ where } \lambda_i \text{ is the loading for factor } i.$$

Meanwhile, **discriminant validity** is evidence that a measure is not assessing something that it is not supposed to assess, and thus reflects the degree to which each construct is unique (Croteau and Bergeron, 2001). This is verified in two ways. First, items associated with a construct must load more strongly on their corresponding construct than on other constructs in the model (i.e., loadings should be higher than cross-loadings) (Chin, 1998b). The second requirement stems from the calculation of each construct's average variance extracted (AVE), whose value should be greater than 0.50 (Fornell and Larcker, 1981). Discriminant validity is exhibited when the shared variance between constructs is lower than the AVE values (Compeau, Higgins, and Huff, 1999; Compeau and Higgins, 1995b). AVE values were calculated using the following formula:

$$AVE = \sum \lambda_i^2 / (\sum \lambda_i^2 + \sum (1-\lambda_i^2)) \text{ where } \lambda_i \text{ is the loading for factor } i.$$

Assessment of the measurement model was performed in two groups: 1) all items related to CSE, PEOU, and BI, which all belonged to previously developed and validated measures, and are constructs which have been used repeatedly in MIS literature, and 2) all items in the five-factor model of personality.

CSE, PEOU, and BI: Primarily, a confirmatory factor analysis (CFA) was performed in order to assess whether the items in the model were loading on the appropriate construct, as well as were correlating more strongly with items of the same construct than with the other items. The initial loading structure matrix, as shown in Table 4.3, demonstrates that all items meet the 0.50 or above criteria. However, items 1, 3, and 8 of the CSE construct also load above the 0.50 cutoff point on the PEOU construct, thus effectively loading on two constructs, and indicating a problem with the discriminant validity of these items. As such, these three CSE items were dropped from further analysis. A second CFA was then conducted and the remaining loadings were all in keeping with the previously cited criteria. Results are presented in Table 4.4.

The Rho and AVE values for each construct were then calculated. As shown in Table 4.5, results pertaining to the internal consistency of the CSE, PEOU, and BI constructs all meet the threshold, as all Rho values are above 0.70. In addition, all AVE values are above 0.50. Furthermore, all constructs share more variance with their own indicators (as seen in the diagonal) than with other constructs (shared variance) thus demonstrating the constructs' discriminant validity.

Table 4.3: Initial Loading Structure Matrix (CSE, PEOU, BI)

| | COMPONENT | | |
|-------|-----------|------|-----|
| | CSE | PEOU | BI |
| CSE1 | .74 | .54 | .26 |
| CSE2 | .80 | .26 | .11 |
| CSE3 | .86 | .53 | .34 |
| CSE4 | .85 | .39 | .18 |
| CSE5 | .85 | .36 | .20 |
| CSE6 | .85 | .29 | .14 |
| CSE7 | .82 | .33 | .14 |
| CSE8 | .82 | .52 | .28 |
| CSE9 | .85 | .29 | .12 |
| CSE10 | .89 | .38 | .22 |
| PEOU1 | .41 | .80 | .29 |
| PEOU2 | .45 | .92 | .37 |
| PEOU3 | .43 | .90 | .38 |
| PEOU4 | .33 | .79 | .38 |
| PEOU5 | .42 | .90 | .35 |
| PEOU6 | .39 | .93 | .37 |
| BI1 | .21 | .37 | .96 |
| BI2 | .27 | .44 | .92 |
| BI3 | .23 | .40 | .94 |
| BI4 | .20 | .36 | .94 |
| BI5 | .21 | .36 | .97 |

Table 4.4: Second Loading Structure Matrix (CSE, PEOU, BI)

| | COMPONENT | | |
|-------|-----------|------|-----|
| | CSE | PEOU | BI |
| CSE2 | .80 | .26 | .11 |
| CSE4 | .83 | .39 | .18 |
| CSE5 | .87 | .36 | .20 |
| CSE6 | .91 | .29 | .14 |
| CSE7 | .81 | .33 | .14 |
| CSE9 | .91 | .29 | .12 |
| CSE10 | .90 | .38 | .22 |
| PEOU1 | .34 | .80 | .29 |
| PEOU2 | .38 | .92 | .37 |
| PEOU3 | .35 | .90 | .38 |
| PEOU4 | .26 | .79 | .38 |
| PEOU5 | .35 | .90 | .35 |
| PEOU6 | .31 | .93 | .37 |
| BI1 | .16 | .37 | .96 |
| BI2 | .21 | .44 | .92 |
| BI3 | .18 | .40 | .94 |
| BI4 | .15 | .36 | .94 |
| BI5 | .16 | .36 | .97 |

Table 4.5: Reliability and Validity (CSE, PEOU, BI)

| Construct (#Items) | CSE Rho = 0.95 | PEOU Rho = 0.95 | BI Rho = 0.98 |
|--------------------|-------------------|--------------------|------------------|
| CSE (7) | 0.74 | | |
| PEOU (6) | 0.14 | 0.77 | |
| BI (5) | 0.03 | 0.17 | 0.90 |

The Five-Factor Model of Personality: The same reliability and validity assessments were conducted for the items pertaining to the five-factor model. An initial confirmatory factor analysis was conducted to view the loadings of each item (see Table 4.6). Four items loaded below the imposed 0.50 level (2 from openness, 1 from conscientiousness, and 1 from agreeableness).

At this stage, the problematic items were dropped before the calculation of the Rho and AVE values. Subsequently, Rho values for all constructs were well above the desired 0.70 level (see Table 4.7), thus demonstrating convergent validity. However, although the shared variance among the constructs were much lower than the AVE values (thus showing discriminant validity), only one of the constructs (extraversion) had an AVE value above the prescribed 0.50 level (AVE = 0.51).

Table 4.6: Initial Loading Structure Matrix (The Five-Factor Model)

| | COMPONENTS | | | | |
|-----|------------|-------|-------|-------|------|
| | EXTRA | AGREE | CONSC | NEURO | OPEN |
| P1 | .75 | .00 | .04 | .05 | .17 |
| P6 | .73 | .05 | .08 | .01 | .14 |
| P11 | .67 | .36 | .41 | -.24 | .40 |
| P16 | .67 | .32 | .29 | -.16 | .54 |
| P21 | .79 | -.03 | .10 | .04 | .10 |
| P26 | .68 | .06 | .33 | -.15 | .37 |
| P31 | .61 | .06 | .11 | -.22 | .00 |
| P36 | .79 | .27 | .28 | -.12 | .20 |
| P2 | -.15 | .47 | .14 | -.19 | -.06 |
| P7 | .13 | .53 | .24 | -.13 | .25 |
| P12 | -.03 | .58 | .35 | -.13 | -.01 |
| P17 | .13 | .54 | .10 | -.36 | .34 |
| P22 | .07 | .62 | .14 | -.09 | .08 |
| P27 | .40 | .51 | .21 | -.12 | .14 |
| P32 | .20 | .77 | .36 | -.07 | .27 |
| P37 | -.06 | .61 | .41 | -.28 | .09 |
| P42 | .25 | .63 | .23 | -.13 | .32 |
| P3 | .22 | .25 | .70 | -.06 | .29 |
| P8 | -.07 | .09 | .50 | -.05 | .04 |
| P13 | .29 | .41 | .63 | -.07 | .33 |
| P18 | -.01 | .13 | .57 | -.09 | -.16 |
| P23 | .27 | .33 | .63 | -.17 | .00 |
| P28 | .23 | .27 | .55 | -.22 | .30 |
| P33 | .21 | .28 | .68 | -.18 | .25 |
| P38 | .30 | .25 | .66 | -.18 | .02 |
| P43 | .02 | .26 | .57 | -.21 | .00 |
| P4 | -.29 | -.25 | -.25 | .46 | -.08 |
| P9 | -.16 | -.14 | -.07 | .71 | -.18 |
| P14 | .03 | -.19 | -.01 | .67 | -.08 |
| P19 | .01 | .10 | .02 | .57 | .13 |
| P24 | -.12 | -.31 | -.27 | .74 | -.09 |
| P29 | -.06 | -.31 | -.30 | .63 | .01 |
| P34 | -.03 | -.09 | -.13 | .67 | -.22 |
| P39 | -.09 | -.20 | -.15 | .63 | -.05 |
| P5 | .20 | .05 | .03 | -.02 | .71 |
| P10 | .29 | .27 | .21 | -.09 | .55 |
| P15 | .19 | .29 | .26 | -.12 | .68 |
| P20 | .29 | .23 | .12 | -.03 | .66 |
| P25 | .21 | .24 | .18 | -.24 | .78 |
| P30 | .25 | .11 | .06 | .03 | .70 |
| P35 | .32 | .29 | .14 | -.12 | .38 |
| P40 | .12 | .16 | .12 | -.12 | .69 |
| P41 | .09 | .07 | .02 | -.04 | .28 |
| P44 | .14 | .05 | .11 | .02 | .59 |

Table 4.7: Reliability and Validity (The Five-Factor Model)

| Construct (# items) | Extra Rho = 0.89 | Agree Rho = 0.87 | Consc. Rho = 0.84 | Neuro. Rho = 0.85 | Open. Rho = 0.87 |
|------------------------|------------------------|------------------------|-------------------------|-------------------------|------------------------|
| EXTRA (8) | 0.51 | | | | |
| AGREE (8) | 0.05 | 0.38 | | | |
| CONSC (9) | 0.08 | 0.18 | 0.38 | | |
| NEURO (7) | 0.01 | 0.06 | 0.04 | 0.44 | |
| OPEN (8) | 0.10 | 0.08 | 0.04 | 0.01 | 0.46 |

As such, it was necessary to conduct an exploratory factor analysis (EFA), analyzing a series of loading structure matrices and eliminating those items that either 1) did not load on their own construct, 2) did not load above 0.50, or 3) loaded on more than one construct. In order to present the cleanest results possible, 21 of the items were eliminated from further analysis. Ultimately, the remaining constructs retained the following number of items: extraversion (6), openness (5), neuroticism (6), agreeableness (3), and conscientiousness (3). The final loading structure matrix is presented in Table 4.8.

Following this process, both reliability and validity estimates were recalculated. As seen in Table 4.9, each construct maintained a Rho value above the prescribed 0.70 value. More importantly, following the elimination of the 21 items, each construct had an AVE value above 0.50, except for neuroticism (AVE = 0.45). However, the reasons for keeping neuroticism for further analysis were two-fold: 1) due to the exploratory nature of the study, and 2) because its average variance extracted is much higher than its shared variance with any other construct. Most importantly, all remaining items are associated with their own construct as outlined in the Big Five Inventory measure (John et al., 1991).

Table 4.8: Final Structure Loading Matrix (The Five-Factor Model)

| | COMPONENTS | | | | |
|-----|------------|-------|-------|-------|------|
| | EXTRA | AGREE | CONSC | NEURO | OPEN |
| P1 | .78 | .21 | -.06 | .08 | .06 |
| P6 | .79 | .21 | -.03 | .02 | .10 |
| P21 | .86 | .19 | .01 | .04 | .04 |
| P26 | .63 | .14 | .09 | -.13 | .37 |
| P31 | .65 | .05 | .01 | -.19 | -.01 |
| P36 | .77 | .42 | .10 | -.03 | .13 |
| P27 | .38 | .70 | .15 | -.09 | .05 |
| P32 | .11 | .83 | .19 | -.02 | .24 |
| P42 | .19 | .82 | .06 | -.11 | .28 |
| P3 | .16 | .25 | .75 | -.05 | .30 |
| P8 | -.09 | .06 | .79 | -.03 | .00 |
| P18 | -.01 | .07 | .70 | -.09 | -.15 |
| P9 | -.09 | -.02 | .02 | .71 | -.19 |
| P14 | .02 | -.13 | -.09 | .73 | -.09 |
| P19 | .00 | .09 | .00 | .65 | .10 |
| P29 | -.01 | -.18 | -.21 | .60 | -.06 |
| P34 | .03 | -.07 | -.01 | .70 | -.28 |
| P39 | -.08 | -.08 | .00 | .64 | -.02 |
| P5 | .15 | .15 | .00 | -.06 | .78 |
| P15 | .08 | .18 | .09 | -.08 | .76 |
| P20 | .20 | .23 | .04 | -.01 | .66 |
| P25 | .09 | .19 | .05 | -.22 | .88 |
| P40 | .04 | .23 | .10 | -.13 | .68 |

Table 4.9: Final Reliability and Validity (The Five-Factor Model)

| Construct (# Items) | Extra. Rho = 0.88 | Agree. Rho = 0.83 | Consc. Rho = 0.79 | Neuro. Rho = 0.83 | Open. Rho = 0.87 |
|------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|
| EXTRA (6) | 0.56 | | | | |
| AGREE (3) | 0.08 | 0.62 | | | |
| CONSC (3) | 0.00 | 0.03 | 0.56 | | |
| NEURO (6) | 0.00 | 0.01 | 0.01 | 0.45 | |
| OPEN (5) | 0.02 | 0.06 | 0.01 | 0.02 | 0.57 |

4.4.2 - Correlation Analysis

Following the elimination of items, Pearson's correlation coefficients were calculated for all 8 constructs included in the research model, as shown in Table 4.10. The correlation coefficient, r , is an index of the degree of relationship between two variables (Whitley, 2001).

Correlations Among the Big Five Personality Traits: The results obtained suggest only two significant correlations among the five factors. Extraversion and agreeableness exhibit a significant and positive correlation with one another ($r = .299, p < 0.01$), indicating that increases in one factor correspond with increases in the other. Openness and agreeableness are also positively and significantly correlated ($r = .230, p < 0.01$). Of further note, although the correlations between neuroticism and the other four factors are not significant, all of the correlations are negative in direction.

Correlations Between The Big Five Personality Traits and CSE: Two of the five factors exhibit significant correlations with CSE. First, computer self-efficacy is significantly and positively correlated to extraversion ($r = .177, p < 0.05$) and to

openness ($r = .227, p < 0.01$). Although not significant, the direction of the correlation between CSE and neuroticism is negative ($r = -.029$), as would be expected given the Hypothesis 1.

Correlations Among CSE, PEOU, and BI: The correlation analysis demonstrates that CSE and PEOU are positively and significantly correlated ($r = .381, p < 0.01$), and that increases in one's belief in one's ability to use the Self-Checkout system are correlated with increases in the perception that the system is easy to use.

Both CSE and PEOU are shown to be significantly and positively correlated with behavioral intention. CSE at $r = .182 (p < 0.01)$ and PEOU at $r = .410 (p < 0.01)$, thereby indicating that increases in either computer self-efficacy or perceived ease of use are correlated to increases in behavioral intention to the Self-Checkout system.

In addition, it is interesting to note that none of the 5 factors of personality were significantly correlated to behavioral intention, suggesting that increases in scores of any trait is not correlated to an increase in behavioral intention.

Table 4.10: Correlations Matrix for all Research Variables

| | EXTRA | AGREE | CONSC | NEURO | OPEN | CSE | PEOU | BI |
|-------|--------|--------|-------|-------|--------|--------|--------|-------|
| EXTRA | 1.000 | | | | | | | |
| AGREE | .299** | 1.000 | | | | | | |
| CONSC | -.002 | .155 | 1.000 | | | | | |
| NEURO | -.043 | -.098 | -.080 | 1.000 | | | | |
| OPEN | .144 | .230** | .025 | -.122 | 1.000 | | | |
| CSE | .177* | .037 | .022 | -.029 | .227** | 1.000 | | |
| PEOU | .094 | .057 | .187* | -.022 | .269** | .381** | 1.000 | |
| BI | .045 | .035 | -.005 | .022 | .150 | .182** | .410** | 1.000 |

** p < 0.01 * p < 0.05

4.4.3 - Assessment of the Structural Model

PLS confirmatory path analysis was conducted using the PLS-Graph package. When using PLS, the structural model and hypotheses are evaluated by examining the path coefficients (Croteau and Bergeron, 2001). Constructs in the model were defined by reflective indicators (items). Reflective indicators reflect the underlying construct and as a representation of the construct should be unidimensional and correlated (Gefen, Straub, and Boudreau, 2000).

As an initial step, item loadings were once again verified using PLS-Graph. The outer model loadings for all constructs, shown in Table 4.11, demonstrated that all but one item loaded above the required 0.50 value. As such, prior to further analysis, P6 was discarded, bringing the total number of FFM items to 22. All remaining items loaded well above the 0.50 prescribed value.

Path coefficients and t-statistics were then calculated using the PLS Jack-Knife procedure (Wildt, Lanber, and Durand, 1982). Results of the assessment of the structural model are indicated in Figure 4.4, followed by a discussion of the relationships that were found.

Table 4.11: PLS Outer Model Loadings

| Construct | Item | PLS Outer Model Loading |
|-------------------------------|-------------|--------------------------------|
| Extraversion | P1 | 0.614 |
| | P6 | 0.112 |
| | P21 | 0.706 |
| | P26 | 0.922 |
| | P31 | 0.464 |
| | P36 | 0.628 |
| Agreeableness | P27 | 0.901 |
| | P32 | 0.636 |
| | P42 | 0.723 |
| Conscientiousness | P3 | 0.713 |
| | P8 | 0.782 |
| | P18 | 0.726 |
| Neuroticism | P9 | 0.717 |
| | P14 | 0.696 |
| | P19 | 0.512 |
| | P29 | 0.711 |
| | P34 | 0.736 |
| | P39 | 0.646 |
| Openness | P5 | 0.796 |
| | P15 | 0.842 |
| | P20 | 0.636 |
| | P25 | 0.791 |
| | P40 | 0.428 |
| Computer Self-Efficacy | CSE2 | 0.783 |
| | CSE4 | 0.841 |
| | CSE5 | 0.864 |
| | CSE6 | 0.896 |
| | CSE7 | 0.805 |
| | CSE9 | 0.896 |
| | CSE10 | 0.880 |
| Perceived Ease of Use | PEOU1 | 0.779 |
| | PEOU2 | 0.916 |
| | PEOU3 | 0.899 |
| | PEOU4 | 0.755 |
| | PEOU5 | 0.888 |
| | PEOU6 | 0.918 |
| Behavioral Intention | BI1 | 0.957 |
| | BI2 | 0.926 |
| | BI3 | 0.940 |
| | BI4 | 0.934 |
| | BI5 | 0.918 |

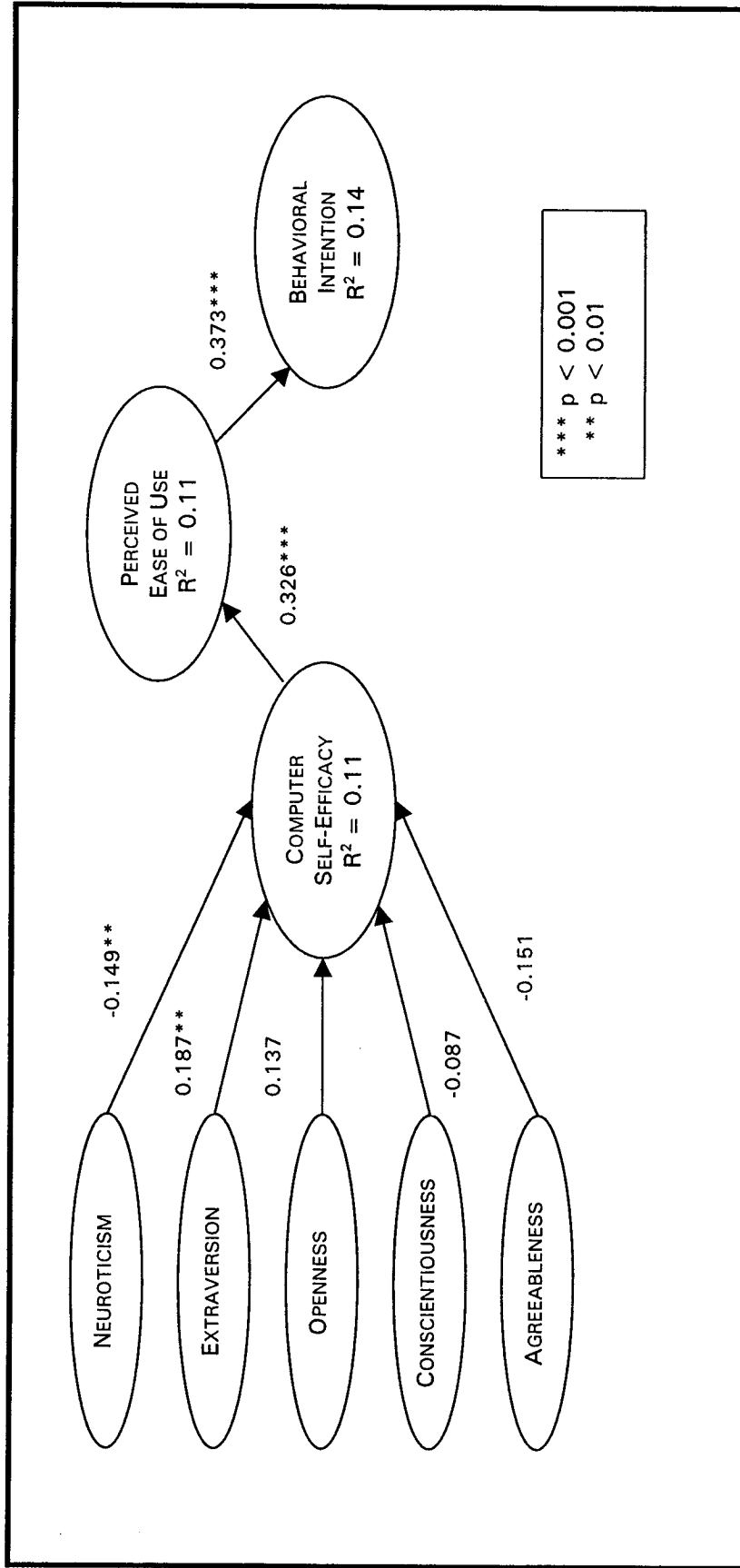


Figure 4.4: PLS Results

4.4.4 - PLS Path Analysis Results

Primarily, neuroticism demonstrated a significant and negative relationship with CSE (path = -0.149, $p < 0.01$), suggesting that individuals who scored higher on neuroticism were less likely to report high levels of CSE, thus supporting hypothesis 1.

Secondly, extraversion exhibited a significant and positive relationship with CSE (path = 0.187, $p < 0.01$). Individuals who therefore scored higher on items related to extraversion were more likely to report higher levels of CSE. This result supports hypothesis 2.

Third, neither openness nor conscientiousness demonstrated a statistically significant relationship with CSE, therefore hypotheses 3 and 4 were not supported. As expected, Agreeableness did not exhibit any statistically significant relationship with CSE hence supporting hypothesis 5.

The final two hypotheses were both supported. CSE showed a strong significant and positive relationship with PEOU (path = 0.326, $p < 0.001$). Therefore, individuals who reported higher levels of CSE were more likely to report higher levels of PEOU, thus supporting hypothesis 6. Finally, PEOU demonstrated a strong statistically significant, positive relationship with BI (path = 0.326, $p < 0.001$). This result indicates that individuals who reported higher levels of PEOU were more likely to report a greater intention to use the Self-Checkout system, thus supporting hypothesis 7. The results of all the hypothesis tests are summarized in Table 4.12.

Overall, two of the five factors of personality (neuroticism and extraversion) together explain 11% of the variance in computer self-efficacy. Meanwhile, computer self-efficacy is shown to explain 11% of the variance in perceived ease of

use. Furthermore, 14% of the variance in behavioral intention is explained by perceived ease of use.

Table 4.12: Summary of Results

| Hypothesis | Support |
|---|---------------|
| H1: Neuroticism $\xrightarrow{-}$ CSE | Supported |
| H2: Extraversion $\xrightarrow{+}$ CSE | Supported |
| H3: Openness $\xrightarrow{+}$ CSE | Not Supported |
| H4: Conscientiousness $\xrightarrow{+}$ CSE | Not Supported |
| H5: Agreeableness $\xrightarrow{\text{NONE}}$ CSE | Supported |
| H6: CSE $\xrightarrow{+}$ PEOU | Supported |
| H7: PEOU $\xrightarrow{+}$ BI | Supported |

CHAPTER 5: DISCUSSION

The current chapter presents a final overview of the study conducted and the results obtained. Each hypothesis is discussed at length, and possible explanations are provided regarding their significance or lack thereof. Implications for research and practice are also examined. Limitations and suggestions for future research are also discussed.

The overarching goal of this research was to uncover additional antecedents to computer self-efficacy, a belief that is associated with one's behavioral intention to use new IT. Specifically, the aim was to investigate the relationship between stable individual differences and CSE. This goal was in direct response to the considerable lack of research regarding individual differences that drive IT acceptance. By examining the relationship between the five-factor model of personality and CSE, it was hoped that the following question would be answered: Are individual levels of neuroticism, extraversion, openness, conscientiousness, and agreeableness related to individual levels of computer self-efficacy, and by extension to IT use behaviors? Furthermore, this research served to better understand the relationship between broad, stable individual traits (the FFM) and dynamic individual traits (CSE). According to Agarwal and Karahanna (2000), understanding the causes of individual beliefs about target information technology is important *"not only to practitioners responsible for the implementation and deployment of IT, but also to researchers interested in explicating the paths through which IT use behavior is manifested"* (p. 666).

5.1 – DISCUSSION OF RESULTS

Of the seven hypothesized relationships five were found to be as expected. Most importantly, two of the five factors of personality, neuroticism and

extraversion, were found to be significant predictors of one's computer self-efficacy. Specifically, neuroticism was significantly and negatively related to CSE, while extraversion was significantly and positively related to CSE. In addition, CSE was found to be significantly and positively related to perceived ease of use, while PEOU was significantly and positively related to behavioral intention to use technology.

5.1.1 - The FFM and CSE

The results of this study provide evidence that certain personality factors do have some influence on one's computer self-efficacy. Specifically, it appears that individuals who are emotionally stable (i.e., score low on neuroticism), and assertive, sociable, and energetic (i.e., score high on extraversion) are more likely to believe that they are capable of performing computer-related tasks, as exemplified in the current study of Concordia University's Self-Checkout system.

Neuroticism: The finding that neuroticism is significantly and negatively related to CSE is in keeping with previous research that has related this personality trait, or some aspect of it, to some form of self-efficacy. Neuroticism was previously shown to be significantly and negatively related to self-efficacy for participating in self-managed work groups (Thoms et al., 1996). Moreover, individuals who score higher on neuroticism tend to avoid situations that require them to take control (Judge et al., 1997) and lack self-confidence. In the situation under investigation, respondents were questioned on whether they believed they could operate the Self-Checkout system under various circumstances. The CSE measure included questions such as *"I could check out my own books using the*

Self-Checkout system if there was no one around to tell me what to do as I go” or “...if I had only the instructions for reference”. These questions examine the respondents’ ability to take control and their confidence in using a new IT. Thus, it is not surprising that an individual who may lack confidence or avoids taking control would not score as high on the CSE measure.

Extraversion: Similarly, the finding that extraversion is a significant predictor of CSE is also in line with previous research. Extraversion has demonstrated a significantly positive relationship with self-efficacy for participating in self-managed work groups (Thoms et al., 1996). In addition, research has shown that extraverts have higher levels of arousal than other personality types resulting in higher levels of self-efficacy (Taylor et al., 1984). Extraverts are characterized as assertive and tend to take on leadership roles. They are also quicker to take initiative and adapt to change (Walczuch and Lundgren, 2004). In assessing one’s CSE towards using a new IT such as the Self-Checkout system, respondents are presented with an alternative method to borrow books from the library. They are being asked whether they are comfortable and have the ability to perform a task that is not only completely new to them, but also completely voluntary and therefore requires individuals to change their existing routine for borrowing books. This study shows that individuals who score higher on extraversion, and who are thus more likely to assert themselves, take initiative, and adapt to change, are also more likely to believe in their ability to use the new IT.

Openness: Of the insignificant findings, the most curious one is the path between openness and CSE. This finding is possibly counterintuitive when

examining the characteristics associated with openness, as these individuals tend to show more willingness to embrace new concepts and to be more careless with respect to new situations and experiences (Walczuch and Lundgren, 2004). Pervin and John (1997) describe individuals high on openness as those who are proactive seeking, are appreciative of experience for its own sake, and are more likely to tolerate and explore the unfamiliar. All the characteristics just listed closely align openness with the situation-specific stable trait of personal innovativeness in information technology (PIIT), which has been shown as a predictor of CSE (Thatcher and Perrewe, 2002). Interestingly, previous research examining the relationship between openness and self-efficacy for participating in self-managed workgroups also found no significant relationship (Thoms et al., 1996). It is therefore possible that the broad trait of openness itself does not relate to self-efficacy, and that more specific forms of the personality trait (such as PIIT) serve as better predictors.

Conscientiousness: Conscientiousness also did not exhibit a significant relationship with CSE. Conscientiousness is related to an individual's degree of self-control, as well as need for achievement, order and persistence (Costa et al., 1991). This particular factor has been related to job performance (Barrick and Mount, 1991), leadership (Taggar et al., 1999), as well as with self-efficacy for participating in self-managed work groups (Thoms et al., 1996). The lack of significance in this relationship is peculiar, as one would expect individuals who demonstrate persistence and an achievement orientation to believe in their ability to use a new IT. It is of note that the measure of conscientiousness was ultimately based only on three items, as opposed to the nine items associated with it in the

original BFI measure. It is therefore possible that the elimination of six items had an effect on the results. Further investigation on the influence of conscientiousness on CSE is therefore required before any strong conclusion can be drawn.

Agreeableness: The final factor, agreeableness, also showed no significant relationship with CSE. However, unlike openness and conscientiousness, this finding was in keeping with the original hypothesis. Individuals high on agreeableness are associated with tendencies toward kindness, unselfishness, generosity and fairness (Goldberg, 1992). In past research, agreeableness was not found to be a predictor of leadership (Taggar et al., 1999) or performance measures such as job proficiency or training proficiency (Barrick and Mount, 1991). It also demonstrated no significant relationship with self-efficacy for participating in self-managed work groups (Thoms et al., 1996).

5.1.2 - CSE and PEOU

The strong relationship found between CSE and PEOU is in accordance with several studies that have examined the antecedents of perceived ease of use. Venkatesh and Davis (1996) demonstrated a causal flow from computer self-efficacy to system-specific perceived ease of use (Venkatesh and Davis, 1996), and indicated that an individual's perception of a particular system's ease of use is linked to her or his general CSE at all times. Research has also shown that the relationship between application specific CSE and PEOU is stronger than the relationship between general CSE and PEOU (Agarwal et al., 2000). The present study demonstrates this very relationship, as all the original CSE items (Compeau and Higgins, 1995b) were adjusted to reflect the operation of the Self-Checkout

system, and thus represents system-specific CSE. Therefore, individuals who had a greater belief in their ability to use the Self-Checkout system were more liable to find the system easy to use.

5.1.3 - PEOU and Behavioral Intention

The relationship between PEOU and behavioral intention to use found in the current study also comes as no surprise as this relationship has been studied extensively as part of the technology acceptance model (Davis, 1989). PEOU, which is an individual's assessment of the effort involved in the process of using a system, has a direct effect on intention and is considered to be an initial hurdle that users have to overcome for acceptance, adoption, and usage of a system (Davis, 1989; Venkatesh, 2000). This study merely replicates previous findings, and thus demonstrates that in the present scenario individuals who assessed the Self-Checkout system to be easy to use would more likely intend to use the system in the future.

5.2 - IMPLICATIONS FOR RESEARCH

Primarily, I am aware of no published studies focusing on the relationship of the FFM to attitudes and beliefs relating to information technology adoption, and specifically towards computer self-efficacy. Most theories of technology adoption focus on the individual's perception of technology-related factors, such as usefulness, relative advantage, and compatibility. However, researchers have proclaimed that a greater understanding is required of how differences at an individual level contribute to eventual technology adoption and use. The finding that neuroticism and extraversion are significant predictors of one's CSE thus

contributes in filling an important void in this literature. Indeed, the finding that neuroticism and extraversion are significantly related to CSE gives credibility to the notion that individuals may inherently differ in their eventual acceptance of new information technology. The present study has also expanded previous research on computer self-efficacy. By introducing the concept of personality into the CSE research, we have begun to answer Thatcher and Perrewé's (2002) call for research examining the role of personality traits in differentiating individuals with low CSE versus individuals with high CSE.

Secondly, the findings in this study add to the line of research examining the relationship between stable and dynamic individual differences, and their role in technology adoption and use. Prior studies have mainly examined the role of stable individual differences such as demographics or states (e.g., Agarwal and Prasad, 1999). However, the study of stable personality traits as represented by the FFM in conjunction with a dynamic individual trait such as CSE and finding two significant relationships is a large step. The findings are especially meaningful as recent research by Thatcher and Perrewé (2002) showed that situation-specific traits (i.e., PIIT) exert an influence on IT situation-specific individual differences such as CSE, while stable broad traits (such as trait anxiety and negative affectivity) did not. The current findings therefore provide new evidence that a link between stable broad traits, such as neuroticism and extraversion, and the dynamic trait of CSE does in fact exist.

Moreover, this study is also interesting from an organizational behavior standpoint as much research has been conducted over the last two decades examining the relationship between the five factors of personality and organizational behavior variables such as leadership, job satisfaction, and job performance. By

uncovering relationships between two of the five factors with CSE, further relevance has been bestowed upon the FFM and its potential role in organizational behavior.

This study has also shed further light on the research involving the relationship between computer self-efficacy, perceived ease of use, and behavioral intention. Despite evidence that CSE is directly related to BI (Hill et al., 1987), more recent research has found that this relationship is fully mediated by PEOU (Venkatesh and Davis, 1996; Venkatesh, 2000). The latter viewpoint is supported in the present study.

Thus, in summary, in addition to studying individual personality traits in the IT adoption and use context, the present study also contributes to two other research areas. It comes on the heels of research studying the relationship between stable and dynamic individual differences. And, furthermore, it adds to organizational behavior literature that has shown a renewed interest in the role of personality due to the convergence on the FFM as the premiere taxonomy of traits.

5.3 - IMPLICATIONS FOR PRACTICE

In terms of managerial implications, this study is useful in identifying which employees are keener towards voluntarily using new information technology, and which types of individuals could serve as advocates of new systems in organizations. Recruitment and careful selection of individuals to be targeted for new technologies represent important managerial actions that can promote technology acceptance (Agarwal and Prasad, 1999). Specifically, managers wanting to implement new IT may want to target individuals who exhibit higher levels of

extraversion and lower levels of neuroticism because these individual traits may signify higher levels of CSE and thus a willingness to accept and use new IT.

Findings from this study may also be useful in the implementation of computer-training programs, whereby individuals who need more attention and whose confidence and self-efficacy need to be boosted can be catered to specifically. As two broad stable individual differences have been associated with CSE it may be possible, as suggested by Thatcher and Perrewe (2002), to use trait measures to place groups of employees in training programs. Such groupings would allow course designers to develop techniques that address the unique needs of different groups of IT users. For instance, in groups where individuals are already predisposed to believing in their ability to use a new system, the focus could shift from increasing computer self-efficacy to emphasizing other features of the new technology. Whereas, in groups where individuals may not be as predisposed to believing in their ability to use the system, the initial focus could remain on building their CSE and emphasizing the ease of use of the system. As traits such as neuroticism and extraversion can be assessed in advance of any planned implementations, managers can determine and implement strategies for training prior to implementation of the new IT, which will expedite the IT adoption process in organizations.

Also, as Marakas et al. (1998) point out, the cost of employee training is quite high. Thus, any development in understanding the differences between individuals of high CSE versus those with low CSE will allow managers to better allocate their resources. Therefore, training mechanisms intended to increase CSE must be targeted at those who will most benefit rather than applied in a uniform

manner that could be beneficial in some situations while wasting valuable corporate resources in other situations.

5.4 - LIMITATIONS

While the findings of this study provide interesting insights into the individual traits that may help or hinder the acceptance of technology, readers must also take into account the limitations of the study.

Primarily, this study may be limited in its external validity. To assess the external validity of the study, one needs to consider both the respondents and the setting in which the study took place. Since the setting for the study was a university and the respondents were limited to graduate students and faculty, the generalizability of the respondents to a more general workforce may be limited.

Another limitation of the study involves the problems encountered during the analysis phase with the John et al. (1991) 44-item Big Five Inventory (BFI). The BFI is one of several shorter measures of the FFM, including the 60-item NEO FFI (Costa and McCrae, 1992) and a 50-item short version of the IPIP (International Personality Item Pool; Goldberg, 1999). According to John and Srivastava (1999), all these measures demonstrate comparable reliability and validity indices. The BFI has been used in several studies (e.g., John et al., 1991; John and Srivastava, 1999; Vaidya, Gray, Haig, and Watson, 2002; Watson, Suls, and Haig, 2002), and is considered to be easier to complete than the NEO FFI. It has also exhibited high reliability and validity in the past (John and Srivastava, 1999). However, in the present study four of the five factors did not initially meet the criteria for convergent validity. It was only following the elimination of 21 of 44 items that the validity criteria were respected. Since the BFI is an instrument that has demonstrated validity in the past,

it may be that the problems faced were incurred for other reasons, such as the small sample size. The problems that were encountered with the John et al. (1991) BFI measure thus warrant further investigation before opting for another measure in future research.

As mentioned earlier, the small sample size in this research may have affected the results. Moreover, due to the cross-sectional nature of this study the extent to which causality can be inferred is also limited. As well, due to the lack of longitudinal data we could not assess whether personality traits will influence technology use over time.

In addition, as data was collected through a web-based survey, the study is perhaps biased towards respondents with higher levels of *general* computer self-efficacy. The study takes for granted that respondents possessed the ability to 1) access their emails, and 2) use their web browser. Nevertheless, this methodology was utilized because it enabled greater access to the population under investigation. Furthermore, this methodology was deemed suitable since the present research model studies *system-specific* CSE in relation to the Self-Checkout system, and not general CSE. Nevertheless, it is likely that the use of a web-survey to collect data may have restricted the range of respondents who answered, alienating those with much lower levels of general computer self-efficacy.

Finally, there were some issues with the technology under investigation. Some of the respondents claimed that the system did not read their ID card, and that this was the reason they did not use the system. Therefore, this may have influenced not only the number of respondents, but also perhaps the responses themselves.

5.5 - FUTURE RESEARCH DIRECTIONS

In the future, the issue of generalizability may be addressed through replication in different contexts and with a range of technologies. In particular, it will be important to uncover the role that individual personality traits play in the acceptance of IT in other organizational settings. As well, it would be beneficial to conduct a similar study with a larger sample size. In addition, the same study may be conducted using a paper-based survey in order to eliminate any respondent bias related to general computer self-efficacy. A longitudinal study should also be conducted in order to assess whether the effect of personality traits on behavioral intention is stable across time. Moreover, to determine whether the effects of training cancel out any effects of personality, therefore making one's personality inconsequential.

It would also be interesting to examine whether personality traits are related to technology use itself, as opposed to the behavioral intention to use IT. As the present study was mainly focused on determining whether personality traits were antecedents to CSE, their relationship to actual usage was not included in the current model. However, such an investigation would allow researchers to relate individual traits with actual behavior rather than with self-report measures, which are typically limited by individuals' willingness and/or ability to make totally accurate reports.

In addition, in light of the difficulties encountered with the BFI measure, a comparison using another measure may be required. Thom et al. (2003) used the NEO-FFI in their study of the relationship between the FFM and self-efficacy for participating in self-managed work groups, and found that three of the five factors were significantly related to self-efficacy.

Moreover, as broad stable personality traits have been shown to relate to CSE, it would be compelling to examine whether direct relationships also exist between broad stable traits and other technology acceptance measures, such as perceived usefulness and perceived ease of use in the TAM model. Further investigation is required to develop a greater knowledge of which broad personality traits are consistently related to technology acceptance variables, and are therefore important in the study of technology adoption and use.

5.6 - CONCLUSION

This study represents one step in developing a more robust understanding of stable individual traits and the role they play in the acceptance and eventual use of information technology. The results of this study serve as evidence that broad stable traits do indeed influence user perceptions and beliefs regarding IT acceptance. Given the undeniable importance of information technology in our every day lives, in both business and personal settings, uncovering the factors that affect their use is of great significance. By demonstrating that stable traits such as neuroticism and extraversion influence computer self-efficacy, our knowledge of this research area has expanded. Moreover, additional information is now available to managers who wish to differentiate between potentially high CSE individuals versus potentially low CSE individuals. The study of personality has become more pervasive in psychology and organizational behavior research and practice, and IS research should also take the opportunity to benefit from this revitalized research stream. The present study is evidence that such research is not only relevant but also important in order to fill a large void in the current literature.

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**APPENDIX A:
LIBRARY PROPOSAL**



THE FIVE-FACTOR MODEL OF PERSONALITY: ITS EFFECT ON COMPUTER SELF-EFFICACY AND THE USE OF NEW TECHNOLOGY

PROJECT PROPOSAL

EXECUTIVE SUMMARY

- When measuring the effect that Information Technology (IT) has had on the workplace, the issue of productivity has often been discussed. The notion of the "productivity paradox" claims that while large investments have been made in IT, these investments have not produced significant improvements in productivity. While the reasons for this paradox are largely debated, low usage of the technology has been offered as one plausible explanation (Landauer, 1995). As such, information systems research has extensively studied the factors and conditions that influence IT acceptance and use by individuals. Among the many factors related to IT use is **computer self-efficacy** (CSE), defined as a judgement about one's capability to use a given technology or application (Compeau and Higgins, 1995). Despite a wealth of studies on the antecedents of CSE, it has never been studied in relation to an individual's **personality**. With the growing interest and credibility of the Five-Factor Model of personality, and in light of past research in management information systems and psychology, the effect of individual personality on one's CSE and furthermore on one's intention to use, or one's actual use of, a new technology will be investigated to hopefully better explain and predict IT adoption and use.

DATA COLLECTION

- Data will be collected by means of a web-survey.
- Thus far, I have access to approximately 1600 Concordia University community members and potential library users. These individuals, graduate students and faculty members at Concordia University, will be contacted through email, which will provide them a link to the web-survey. (Please note that since the survey will be online, I will not be soliciting any participants on the library premises.)

SURVEY:

- The survey will consist mostly of questions to be answered on Likert scales (ex: 1 = Disagree Strongly to 7 = Agree Strongly). The completion of the questionnaire should take approximately 15-20 minutes.
- The questions will examine individual 1) personality traits, 2) sense of computer self-efficacy, 3) ease with which they use computers, 4) their intention to use or continue use of the technology in question, and 5) demographics (i.e., age range, gender).

APPENDIX B:
MEASUREMENT TOOLS

PERSONALITY TRAITS (THE BIG FIVE INVENTORY): John et al. (1991)

On a 5-point Likert Scale: 5 = Agree Strongly and 1 = Disagree Strongly

I see myself as someone who

1. ... is talkative
2. ... tends to find fault with others (R)
3. ... does a thorough job
4. ... is depressed, blue
5. ... is original, comes up with new ideas
6. ... is reserved (R)
7. ... is helpful and unselfish with others
8. ... can be somewhat careless (R)
9. ... is relaxed, handles stress well (R)
10. ... is curious about many different things
11. ... is full of energy
12. ... starts quarrels with others (R)
13. ... is a reliable worker
14. ... can be tense
15. ... is ingenious, a deep thinker
16. ... generates a lot of enthusiasm
17. ... has a forgiving nature
18. ... tends to be disorganized (R)
19. ... worries a lot
20. ... has an active imagination
21. ... tends to be quiet (R)
22. ... is generally trusting
23. ... tends to be lazy (R)
24. ... is emotionally stable, not easily upset (R)
25. ... is inventive
26. ... has assertive personality
27. ... can be cold and aloof (R)
28. ... perseveres until the task is finished
29. ... can be moody
30. ... values artistic, aesthetic experiences
31. ... is sometimes shy, inhibited (R)
32. ... is considerate and kind to almost everyone
33. ... does things efficiently
34. ... remains calm in tense situations (R)
35. ... prefers work that is routine (R)
36. ... is outgoing, sociable
37. ... is sometimes rude to others (R)
38. ... makes plans and follows through with them
39. ... gets nervous easily
40. ... likes to reflect, play with ideas
41. ... has few artistic interests (R)
42. ... likes to cooperate with others
43. ... is easily distracted (R)
44. ... is sophisticated in art, music, or literature

COMPUTER SELF-EFFICACY: Compeau and Higgins (1995b)

On a 10-point Likert Scale: 10 = Totally Confident and 1 = Not at all Confident

I could check out my own books using the Self-Checkout system...

1. ... if there was no one around to tell me what to do as I go.
2. ... if I had never used a system like it before.
3. ... if I had only the instructions for reference.
4. ... if I had seen someone else using it before trying it myself.
5. ... if I could ask someone for help if I got stuck.
6. ... if someone else had helped me get started.
7. ... if I had a lot of time to complete the task for which the system was provided.
8. ... if I had just the built-in help facility for assistance.
9. ... if someone showed me how to do it first.
10. ... if I had used a similar system before this one to do the same job.

PERCEIVED EASE OF USE: Davis (1989)

On a 7-point Likert Scale: 7 = Strongly Agree and 1 = Strongly Disagree

1. Learning to operate the system would be easy for me.
2. I would find it easy to get the system to do what I want it to do.
3. My interaction with the system would be clear and understandable.
4. I would find the system to be flexible to interact with.
5. It would be easy for me to become skillful at using the system.
6. I would find the system easy to use.

BEHAVIORAL INTENTION TO USE: Chau and Hu (2002) and Venkatesh et al. (2003)

On a 7-point Likert Scale: 7 = Strongly Agree and 1 = Strongly Disagree

1. I intend to use the Self-Checkout system for my future book borrowings.
2. To the extent possible, I would use the Self-Checkout system frequently.
3. I predict I would use the Self-Checkout system for my future book borrowings.
4. I intend to use the Self-Checkout system for book borrowing as often as possible.
5. I plan to use the Self-Checkout system for my future book borrowings.

APPENDIX C:
PRE-TEST EMAIL AND INSTRUCTIONS

APPENDIX D:
WEB-SURVEY SCREENSHOTS

FILTER QUESTIONS

The screenshot shows a survey interface. At the top left is the logo for the John Molson School of Business at Concordia University. The survey title is "Survey on the Usage of Concordia University Library Systems".

Welcome! The following survey will take approximately 10-15 minutes to complete. You will be asked to fill out each section before pressing the "Next" button. Please read any instructions before answering. Also, please answer as honestly as possible. As your participation is completely anonymous and confidential.

In the last year, have you borrowed books from the Webster (downtown campus) or Vanier (Loyola campus) libraries at Concordia University?

Yes No

Next >>

The bottom of the screenshot shows a Windows taskbar with the "start" button, several open applications, and a system tray showing the time as 11:46 AM.


Survey on the Usage of Concordia University Library Systems

When checking out books from either Concordia library, have you ever used the self-checkout system?

Yes No

Next >

COMPUTER SELF-EFFICACY ITEMS



John Molson
School of Business
Concordia University

Survey on the Usage of Concordia University Library Systems

Windows taskbar icons

Please read the following description carefully. Currently, both Concordia University Libraries have in place a Self-Checkout system located on the same floor as the additional ones you can find. This system allows library users to check out materials by themselves using their library card and PIN, that can be obtained online through the library's CLICS system. To check out a book using the self-checkout system, users must follow a step-by-step process that is conveyed on a monitor. Once a user has completed check-out, he/she will get a receipt indicating the date of return.

The following questions ask you to indicate whether you could use the Self-Checkout system under a variety of conditions.

For each condition, please rate your confidence by choosing a number from 1 to 10, where 1 indicates "Not at all confident", 5 indicates "Moderately confident", and 10 indicates "Totally confident".

I could check out my own books using the Self-Checkout system...

| | 1 Not confident at all | 2 | 3 | 4 | 5 Moderately confident | 6 | 7 | 8 | 9 | 10 Totally confident |
|---|---------------------------------|-----------------------|-----------------------|-----------------------|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------|
| If there was no one around to tell me what to do as I go | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I had used a system like it before | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I had only the instructions for reference | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I had seen someone else using it before trying it myself | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Windows taskbar icons

start

2 FirstClass@ Client

http://www.surveya...

screenshots - Microso...

11:46 AM

For each condition, please rate your confidence by choosing a number from 1 to 10, where 1 indicates "Not at all confident", 5 indicates "Moderately confident", and 10 indicates "Totally confident".

I could check out my own books using the Self-checkout system.

| | 1 Not at all confident | 2 | 3 | 4 | 5 Moderately confident | 6 | 7 | 8 | 9 | 10 Totally confident |
|---|------------------------------|-----------------------|-----------------------|-----------------------|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------|
| If there was no one around to tell me what to do as I go | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I had used a system like it before | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I had only the instructions for reference | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I had seen someone else using it before trying it myself | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I could ask someone for help if I got stuck | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If someone else had helped me get started | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I had a lot of time to complete the task for which the system was provided | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I had just a built-in help facility for assistance | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If someone showed me how to do it first | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I had used a similar system before this one to do the same job | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Next >>

PERCEIVED EASE OF USE ITEMS



- 5 x



Survey on the Usage of Concordia University Library Systems

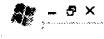
Keeping in mind the description of the Self-Checkout system, please indicate the extent to which you agree with each statement.

There are no right answers - **ALL YOUR OPINIONS COUNT!**

| | Strongly Disagree | Disagree | Slightly Disagree | Neither Agree/Disagree | Slightly Agree | Agree | Strongly Agree |
|--|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|
| Learning to operate the system would be easy for me. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I would find it easy to get the system to do what I want it to do. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| My interaction with the system would be clear and understandable. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I would find the system to be flexible to interact with. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| It would be easy for me to become skillful at using the system. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I would find the system easy to use. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

[Next >>](#)

BEHAVIORAL INTENTION TO USE ITEMS



Survey on the Usage of Concordia University Library Systems

With regards to the Self-Checkout system, please indicate the extent to which you agree with each statement.

| | Strongly Disagree | Disagree | Slightly Disagree | Neither Agree Nor Disagree | Slightly Agree | Agree | Strongly Agree |
|---|-----------------------|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|-----------------------|
| I intend to use the Self-Checkout system for my future book borrowings. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| To the extent possible, I would use the Self-Checkout system frequently. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I predict I would use the Self-Checkout system for my future book borrowings. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I intend to use the Self-Checkout system for book borrowing as often as possible. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I plan to use the Self-Checkout system for my future book borrowings. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

NEXT >>

FIVE-FACTOR MODEL OF PERSONALITY ITEMS



Survey on the Usage of Concordia University Library Systems

On the next 3 screens you will be presented with a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to argue with others?

Please choose the option that best indicates the extent to which you agree or disagree with each statement.

I See Myself as Someone Who:

| | Disagree Strongly | Disagree | Neutral | Agree | Agree Strongly |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Is talkative | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tends to find fault with others | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Does a thorough job | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is depressed, blue | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is original, comes up with new ideas | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is reserved | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is helpful and unselfish with others | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Can be somewhat careless | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is relaxed, handles stress well | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is curious about many different things | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is full of energy | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Starts quarrels with others | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Next >

Survey on the Usage of Concordia University Library Systems

Continued from previous page

I see Myself as Someone Who

| | Highly Strongly | Disorderly or Inefficient | Neither orderly nor disorderly | Orderly or Efficient | Highly Strongly |
|---|-----------------------|------------------------------|---|-------------------------|-----------------------|
| Is a reliable worker | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Can be tense | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is ingenious, a deep thinker | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Generates a lot of enthusiasm | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Has a forgiving nature | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tends to be disorganized | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Worries a lot | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Has an active imagination | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tends to be quiet | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is generally trusting | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tends to be lazy | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is emotionally stable, not easily upset | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is inventive | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Has an assertive personality | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Can be cold and aloof | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Perserveres until the task is finished | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

NEXT >>

Survey on the Usage of Concordia University Library Systems

Continued from previous page

I See Myself as someone who

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Can be moody | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Values artistic, aesthetic experiences | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is sometimes shy, inhibited | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is considerate and kind to almost everyone | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Does thing efficiently | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Remains calm in tense situations | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Prefers work that is routine | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is outgoing, sociable | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is sometimes rude to others | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Makes plans and follows through with them | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Gets nervous easily | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Likes to reflect, play with ideas | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Has few artistic interests | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Likes to cooperate with others | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is easily distracted | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is sophisticated in art, music, or literature | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Next >>

DEMOGRAPHICS

Survey on the Usage of Concordia University Library Systems

Please provide the following information:

Age:

- 18-24
- 25-35
- 36-45
- 46-55
- 56-65
- Over 65

Gender:

- Female
- Male

Faculty:

- Arts and Sciences
- John Molson School of Business
- Engineering and Computer Sciences
- Fine Arts

Are you a:

- Student
- Faculty Member

Thank you for your time and effort.
You may now exit the survey.

APPENDIX E:
EMAILS TO ADMINISTRATORS

APPENDIX F:
INVITATIONS TO PARTICIPATE IN STUDY

APPENDIX G:
REMINDER/THANK YOU EMAILS