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Technophilia: A New Model For Technology Adoption

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TECHNOPHILIA: A NEW MODEL FOR TECHNOLOGY ADOPTION

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Abstract

A new model for technology adoption identifies the adoption process itself as a key factor for successful life-long usage of technology. The distinctive contribution of online entertainment and communication to digital literacy is at the heart of the model, termed technophilia. Non-technophile users, who are less experienced in fun activities, are more likely to encounter the approach-avoidance conflict, to refrain from adopting an open attitude to technology, and to perceive it as more useful compared to technophile users. The current study includes findings and implications for low socioeconomic status groups in comparison with the general population.

Keywords: technology adoption; digital literacy; experience; communication; entertainment

IS and Research – New and alternative approaches to IS research

TECHNOPHILIA: A NEW MODEL FOR TECHNOLOGY ADOPTION

1.0 Introduction

Technology adoption has proven to be the key to economic development (Parente and Prescott, 1994). This is of particular importance at a time when information and communication technologies (ICTs) are becoming ubiquitous in the more affluent areas of the world and rapidly spreading via mobile phone technology to the developing world as well.

This paper presents a new model for technology adoption, which has been often explained in terms such as income level, skills, formal education, or on-the-job training (Romer, 1990). The new model, termed **technophilia,** is important in its ability to embrace a multilevel view of technology adoption, including the individual and organizational levels with some look at the national level. The model may provide new insights to the well-studied fields of digital literacy, management, innovation, and change in technological contexts.

In addition, the model can help revive research in the field of technology acceptance that seems to have reached a dead-end (Benbasat and Barki, 2007). The model shows that the enjoyment which stems from using technology directly impacts subsequent consequences. In particular, the joy found in its entertainment dimensions appear to comprise a critical stage that affects future tendencies in the usage of information technologies.

To be more specific, the new model identifies the extent to which experience gained by using entertainment (playing or downloading games, images or music) and

communication (exchanges over chat rooms or online forums) provided by web-applications contributes to the digital literacy of the individual. This entertaining experience is compared to the extent of use of common Internet services, both in the broad population and in the low economic segments of several European countries. Furthermore, the model can be valuable in the organizational context, by extending the scope of its factors – entertainment, and communication – to the extent of sophistication and openness (respectively) concerning technology. By doing so, the model selectively and specifically offers theoretical explanations for empirical findings and can provide meaningful guidelines for both managers and public policy makers.

One of the antecedents of successful implementation of technology is *experience* (Dickson et al, 1975; Ahituv, 1989; Davis, 1989; Moore and Benbasat, 1991; Venkatesh et al, 2003), but the notion of experience is not clearly defined. There are exceptions, for example, in the UTAUT model experience is one of four moderators mediating the impacts on behavior (Venkatesh et al., 2003). However, it is usually implied to be the result of successful acceptance, or simply behavior (Fishbein and Ajzen, 1975; Ajzen, 1991; Davis, 1989), disregarding potential differences among the types of tasks (Sun and Zhang, 2006a) that are expected to contribute to digital literacy.

The model suggested here defines experience with respect to specific technologies and users, differentiating the types of tasks into two separate factors according to the cognitive and social demands imposed by the adoption of a specific technology. Thus, accumulated practice leads to improved abilities, which contribute to further technology adoption. If engaging in these activities is enjoyable, the cost of gaining expertise (extensive practice) is perceived as a reward; the more any rewarding cycle

is performed, the more it becomes ingrained within the engaging individual. This new framing has the power to explain and offer alternative interpretations to unexpected results of previous studies. Users will increase experience encouraged by positive emotions and enjoyable activity. Indeed, recent research linked design to pleasure, affection, and emotional qualities such as playfulness (Teeni, 2007), and emotions are revealed as rich and complex theoretical concepts with many subtle aspects of generalization and specialization (Ortony and Turner, 1990: 329). With so much research carried out in the field of emotions, information systems (IS) research can certainly expand into broader aspects of motivation and behavior (LeDoux, 1996). The advantages of looking at technology adoption processes from this emotional framework are in expanding the view of technology adoption beyond the onset of the initial stage to the "lifecycle of usage" (Schwarz and Chin, 2007: 233), allowing for better investigation of the impact of experience and suggesting how to keep up with the pace of technology.

2.0 Defining Technophilia

New media consumption is presumed, in this study, to play a key role in reducing barriers to technology adoption by promoting technical skills and online expertise through enjoyment of the experience. Having reviewed research on the extent of enthusiasm or even desire to use ICT, this study reframes the relationship between technology adoption, enjoyment, openness, and assimilation (future use) of technology. The model's antecedent factors comprise the extent of enjoyment when using online entertainment and communication tools: playing games, downloading applications, communicating with friends, collaborating and being in contact with other users. The consequences are digital literacy (SIBIS, 2003a) or computer and web self-efficacy (Bandura, 1977) on the individual level. The next level comprises

users that have acquired a deep understanding of the technology's abilities and limitations. Looking at the individual in an organizational context, for example, technological sophistication and openness are expected to characterize those managers who enjoy using online entertainment and communication tools. Thus, the model draws a line from online entertainment to technological sophistication, and from online communication to openness, both assuming improved cognitive and social abilities.

The new model suggested here, termed ***technophilia***, is not only the mirror image of ***technophobia*** (Rosen et al., 1987; 1993; Rosen and Weil, 1990a; 1990b; 1995; Sinkovics et al., 2002) but leads to the adoption and usage of technology in the long run, emphasizing a certain approach to technology that reflects the qualities of a given technology. In addition, the current study offers new definitions to well-established IS concepts, emphasizing the enthusiastic attitudes and norms toward technology. The focus on predisposed attitudes that may create positive feelings toward technology usage (Fishbein and Ajzen, 1975) or the desire to use technology (Fortin et al., 1997) in the first place leads to some suggestions about the types of tasks, technological artifacts, and their creators. This aspect of the technophilia model draws from the socio-technical approach to information systems (Orlikowski and Robey, 1991; Walsham, 2009).

In this study, technophilia refers to ICT including IS, Internet websites, mobile phones, digital entertainment, and so on. More narrowly, technophilia could be replaced by "Webphilia", emphasizing the communicative aspect of the model. However, the term technophilia seems suitable as the model may be further extended to other types of technology (Basalla, 1988). Scholarly journals occasionally mention the term technophilia in the context of the philosophy of science while investigating

fields such as physics, genetics, gender, and others (for example, Bendle, 2002; Branscomb, 1995; Shendure et al., 2004). Two prominent figures in artificial intelligence mentioned the term technophilia while analyzing the development of technology from an evolutionary point of view (Minsky, 1963, 2006; Kurzweil, 1999). However, the term technophilia in the current context does not refer to its meaning in the futuristic literature.

Technophilia is expected to link enthusiasm toward technology with its rewarded and knowledgeable adoption. In terms of acceptance theories, positive ***attitude*** and ***norm*** are expected to be revealed in daily ***experience*** which is correlated with high ***perceived ease of use (PEOU)***, realistic ***perceived usefulness (PU)s***, and adaptive ***digital literacy (DL)***. Due to their common use, we retain the concepts of perceived ease of use and perceived usefulness; otherwise, we believe that the terms *expected ease of use/usefulness*, or merely *ease of use/usefulness*, would more accurately describe these concepts.

Figure 1 depicts the model on the individual level.

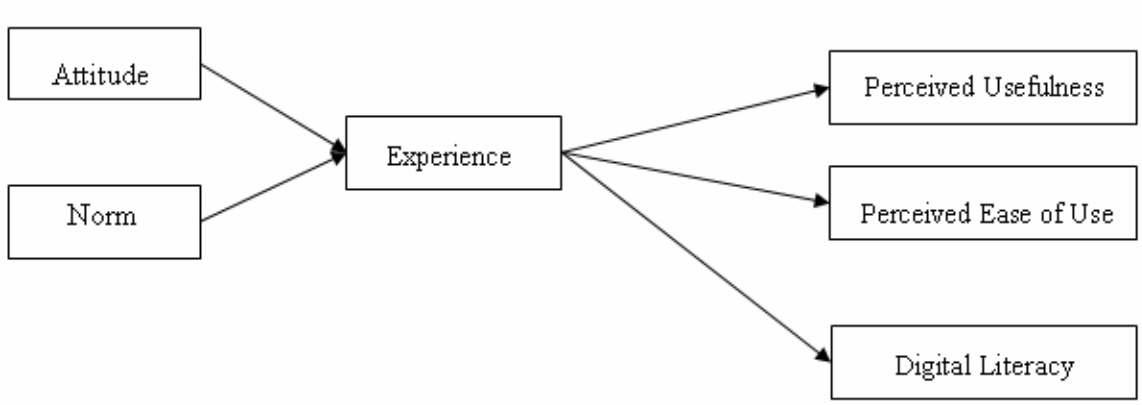


Figure 1. Technophilia in technology acceptance terms

Based on the above, a main research objective is to examine the technophile model in the context of technology acceptance research, but this time increasing the core set of

variables and their predictions to higher levels of manifestation (Lucas et al., 2007). The types of tasks experienced are the issue here. The nature of the tasks is part of the model, expressed in terms of experience with using the Internet as follows:

- Exp-Bus: For general business or governmental purposes, such as obtaining information and official forms or payments from public authorities.
- Exp-Fun: For the purpose of online entertainment (playing or downloading games, images or music) and communicating with friends (exchanges over chat rooms or online forums).

Users are grouped according to their level of Exp-Fun: Subjects high in Exp-Fun (in the 75-100 percentiles) are included in the ***technophile users*** group.

Experiencing either type of task (Exp-Bus or Exp-Fun) is expected to contribute to digital literacy. However, technophile users (considered as those who gained experience with online entertainment and communication tasks, Exp-Fun) are expected to show low PU. In other words, they are expected to evaluate the technology mindfully (Fichman, 2004) but not necessarily to perceive it as highly useful. Evidence in the literature favors this assumption, including meta-analyses investigating the moderating effects of various variables (Davis, 1989; Lee et al., 2003; Legris et al., 2003; Ma and Liu, 2004; King and He, 2006; Schepers and Wetzels, 2007; Seyal and Rahman, 2007; Sun and Zhang, 2006a; Yousafzai et al., 2007a, b). Figure 2 presents the empirical model.

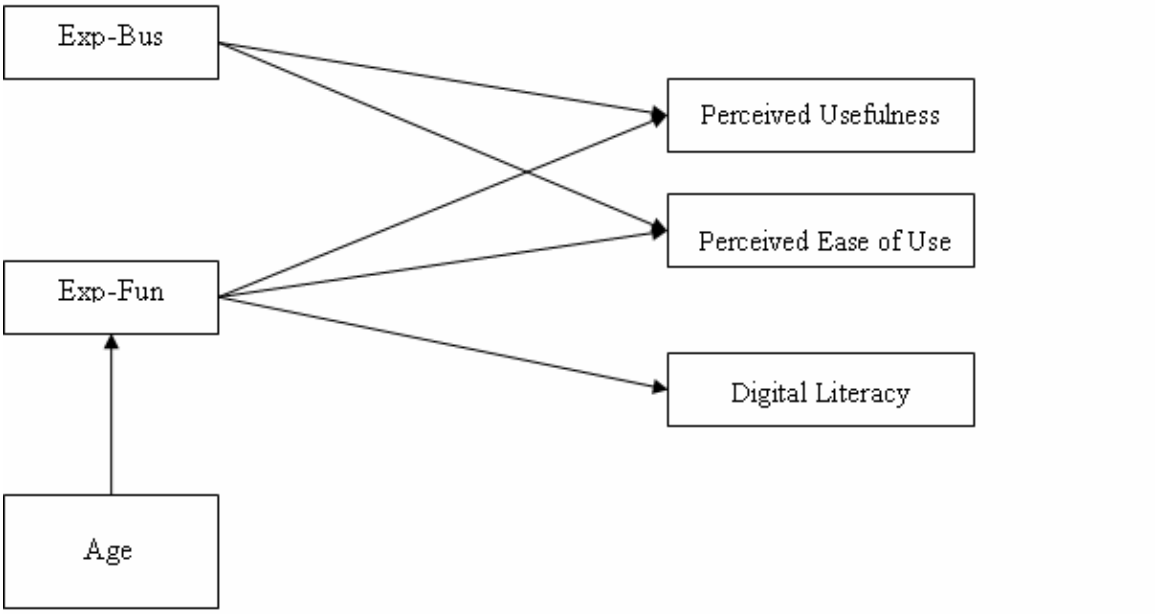


Figure 1 Empirical measures

Note: **Age** is included in the model as it is considered to be a powerful moderator; **Norm** (or subjective norm, SN) was firmly found to influence especially inexperienced users (Sun and Zhang, 2006a) and was thus excluded from the model; **PEOU** is expected to be high for experienced users. It was included despite its debatable role in acceptance research (Yousafzai et al., 2007a, b). **Experience** is measured in two separate types of tasks, **Exp-Bus** for general business or governmental purposes, such as obtaining information, forms, or payments; and **Exp-Fun** for online entertainment and communicating; differentiating these types of experience is necessary for measuring the contribution of enjoyment to **digital literacy**.

Two groups of hypotheses are presented here: hypotheses on experience and digital literacy, and hypotheses on Perceived Usefulness (hereafter – PU) and Perceived Ease of Use (hereafter – PEOU). Each set of hypotheses is preceded by evidence from the literature.

2.1 Hypotheses on experience and digital literacy

The need for an explicit definition for experience that pertains to a specific technology, as opposed to general computer literacy that is considered to be a more stable user trait, was emphasized by researchers who also stressed a distinction between the nature of the tasks involved in technology adoption (Sun and Zhang, 2006a; Yousafzai et al., 2007b). Such an explicit definition of experience would also better define the core properties of the technology. The arrangement of the measurement model in this study provides these necessary distinctions: between experience and digital literacy as well as between the two types of tasks. This is the rationale for the following hypotheses on experience and digital literacy:

Hypotheses set 1.1: correlations with Exp-Fun

a. Exp-Fun is not correlated with PU.
b. Exp-Fun is correlated with PEOU.
c. Exp-Fun is correlated with Digital Literacy.
d. Exp-Fun is correlated with Age.

Hypotheses set 1.2: correlations with Exp-Bus

a. Exp-Bus is not correlated with PU.
b. Exp-Bus is correlated with PEOU.
c. Exp-Bus is correlated with Digital Literacy.
d. Exp-Bus is correlated with Age.

2.2 Hypotheses on PU and PEOU

The following hypotheses consider the value of entertaining experience for PU and PEOU. In line with the proposed technophilia model, previous findings suggested that "computer self-efficacy has significant but negative effect on PU and has a positive and significant effect on PEOU" (Seyal and Rahman 2007: 263). Moreover, Seyal and Rahman (2007: 272) found that "all paths in the model were significant except the path from computer attitude to PU". This finding supports the predictions that experience has an influential effect on PU, and that this influence is subject to moderating effects and therefore does not necessarily manifest in a specific direction. Similarly, Davis (1989) suggested a weak direct link between PU and attitude. This link is explained, according to the technophilia model, as "realistic PU", the ability to critically evaluate the technology based on a deep understanding of it and not necessarily on the perception that it is highly useful (Fichman, 2004). These findings on PU offer an empirical basis for the following hypotheses on PU and PEOU:

Hypotheses set 2.1: quality of means

Compared to the group of low Exp-Fun subjects, the group of high Exp-Fun subjects:

a. Has higher means in PU.

b. Does not have higher means in PEOU.

c. Has higher means in Exp-Bus.

d. Has higher means in Digital Literacy.

e. Has lower means in Age.

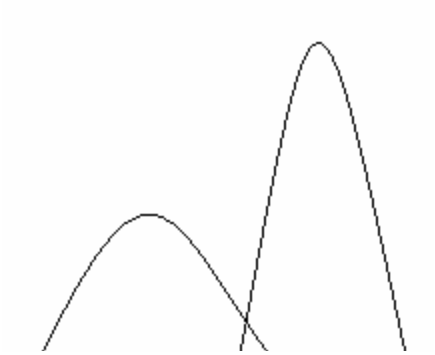
Hypotheses set 2.2: equality of variances

Compared to the group of low Exp-Fun subjects, the group of high Exp-Fun subjects:

a. Has higher variance in PU.

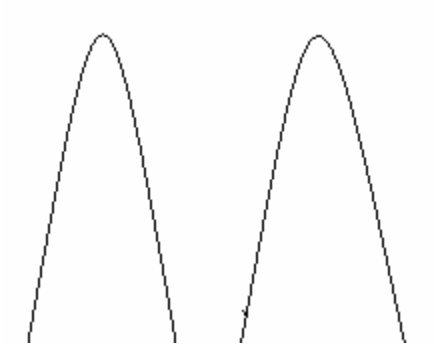
b. For all other variables, equal variance is expected.

Figures 3 and 4 illustrate the expected differences between the groups (high vs. low Exp-Fun levels) in means and variance of PU and in PEOU, respectively.



Left: technophile users; Right: non-technophile users

Figure 2 Expected differences in PU means & variance



Left: non-technophile users; Right: technophile users

Figure 3 Expected differences in PEOU means & variance

3.0 Methodology

In this study we mainly used a survey carried out in six countries, in the segment of low socioeconomic status population (ELOST). Since these were secondary data, results from an additional secondary survey with similar question items were also analyzed. The latter measured patterns of Internet use among the general population in Israel (MOF-SIBIS). There are numerous advantages to analyzing surveys among such large samples, rather than narrow surveys or laboratory studies among students or knowledge workers, as is usually the case in acceptance studies. A sample of students would tend to be more homogeneous, technology-ready, sensitive to trends, younger, and more easily influenced by technology type and peer opinions than non-students (Yousafzai et al., 2007b; Schepers and Wetzels, 2007; King and He, 2006). Similarly, a broad survey is preferred over a laboratory study due to its pertinence to actual contexts in which the adoption takes place (Sun and Zhang, 2006a) and with subjects taking into account consequences of their behavior and performance (Yousafzai et al., 2007b). By analyzing both the ELOST and the MOF-SIBIS findings, the current study enhances the generalizability of its conclusions. The diversified population captures a large range of tendencies, sensitivities, and motivations toward performance, but most importantly – it captures the heterogeneity in technology acceptance and usage.

Date source 1: ELOST

The ELOST survey is focused on e-government usage among low socioeconomic status groups (LSGs) in six countries: Austria, Bulgaria, Finland, France, Germany, and Israel (ELOST, 2007b). The ELOST questionnaire was answered, either

personally or by telephone, by approximately 250 respondents in each of the six countries.

The target group was defined as persons with a low income matching one or more of three additional characteristics. Low income households were defined as having 50% or less than the average or median household income in the country. Additional criteria were low-skill occupations, unemployment for six months or more, and low educational level, *i.e.* without a completed high school diploma. Respondents were selected with regard to specific criteria such as unemployment and minority status from registers of centers for long-term unemployed, for elderly people or for migrants (ELOST, 2007b: 22).

The survey shows a strong socioeconomic bias toward the use of the Internet; the main influencing factors comprising education, occupation and professional qualifications, income, and age. The ELOST survey items and variables are presented in Appendix 1. Since these are secondary data, results from an additional secondary survey were analyzed.

Data Source 2: MOF-SIBIS based on SIBIS

The second data source is a national survey of Internet use in Israel, administered in April 2005 by Smith Research & Consulting Institute on behalf of the Israeli Ministry of Finance. The sample was randomly drawn from the national database of Bezeq, the Israeli incumbent national telephone company. Phone interviews were conducted according to rules set in advance. A sample of 1,230 subjects was selected as representative of the Israeli population (over 7 million people), comprising 1,004 Jewish respondents (722 adults above the age of 18 and 282 minors 12 to 18 years old) and 226 Arab respondents (145 adults and 61 minors).

The MOF-SIBIS survey was based on two surveys conducted by the European project of Statistical Indicators Benchmarking the Information Society, SIBIS (SIBIS, 2003a; Mizrachi et al., 2005). The SIBIS project provided detailed information on the socioeconomic differentials regarding technology use in the general population and made it possible to create the digital literacy indicator. The indicator comprises four indices: Confidence in one's own ability in using the Internet for communicating with others (C); Obtaining or downloading and installing software on a personal computer (O); Questioning sources of information (Q); and Searching sources of information (S). The SIBIS survey items and variables are presented in Appendix 1.

In the next section we present the findings together with new variables, while explaining differences between initial assumptions and the findings. Accordingly, we further solidify the model.

4.0 Findings

In this section and in appendices 2-4 we present the findings and solidify the model. An important and consistent result emerging from both surveys is the absence of significant correlations between Exp-Fun and Exp-Bus, each highly correlated with digital literacy but not with each other. This finding contributes to the key role played by Exp-Fun in the technophilia model. Correlations, t-tests for equality of means and Levene's tests for equality of variances, for each survey, are presented in Appendix 2, including results in relation to the hypotheses, whether they are refuted or confirmed. Figure 5 depicts the essential correlations evident in the model.

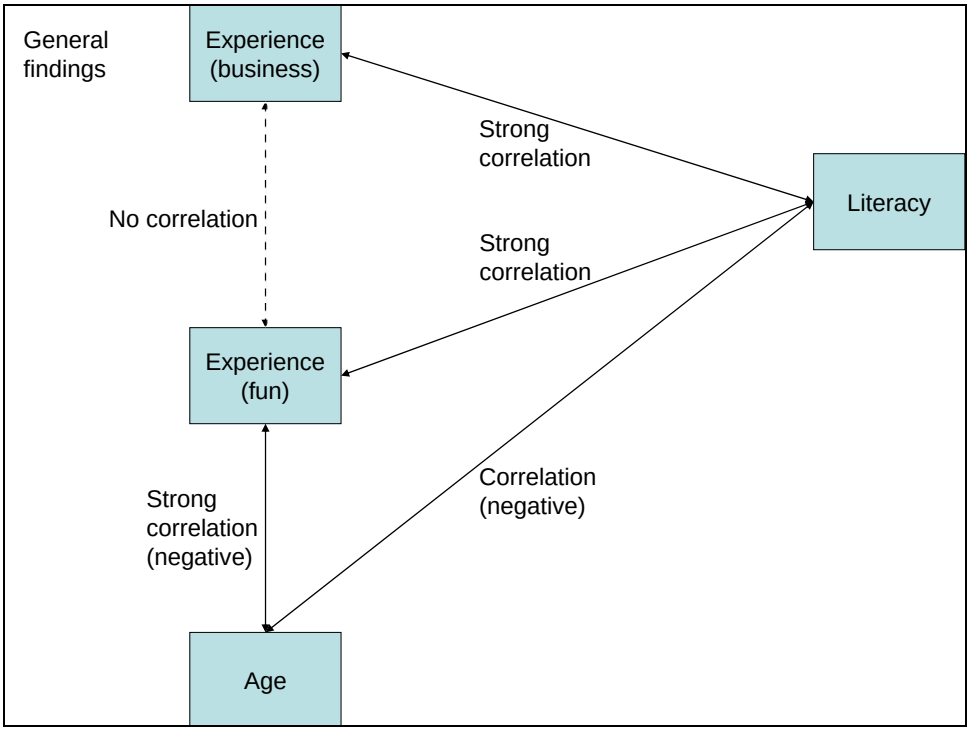
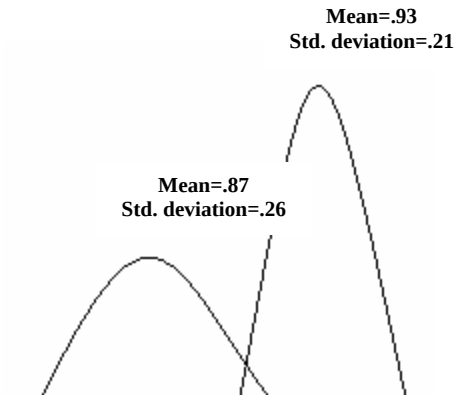


Figure 4 Essential technophile factors

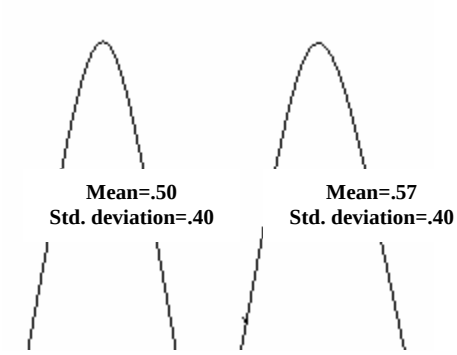
The influence of frequent Internet usage for entertainment and communication was further investigated by dividing each sample into two groups according to their Exp-Fun level: subjects whose scores in Exp-Fun were in the 75-100 percentile were considered as technophile users and included in that group while the rest were considered as non-technophile users. The t-test revealed differences between the two groups in PU, PEOU, experience, digital literacy, and age. Detailed results are presented in Appendix 2.

Following hypotheses set 2, a fundamental finding that supports the suggested technophilia model is the difference found in PU levels between technophile and non-technophile users. Figures 6 and 7 illustrate the results that were found in the ELOST survey for low socioeconomic groups (*cf.* Figures 3 and 4 above, respectively).



Left: technophile users; Right: non-technophile users

Figure 5 Differences in PU means & variance



Left: non-technophile users; Right: technophile users

Figure 6 Differences in PEOU means & variance

The differences established in means and in variances in PU between technophile and non-technophile users suggest that experienced users will be more judgmental or less satisfied with technologies. This finding can be explained as a subjective estimation of the value of information that is known to be sensitive to experience (Ahituv, 1989).

The results obtained by the ELOST survey confirm almost all research hypotheses, and suggest that digital literacy heavily depends on entertaining experience among low socioeconomic status users. The type of user seems critical in understanding the

adoption process as the results were not replicated in the MOF-SIBIS survey, the sample which is representative of the general population in Israel. However, selecting the low socioeconomic segment from the sample (Appendix 3) yielded results consistent with those of the ELOST survey. The differences in means for PU and digital literacy were significant and further support the suggested technophilia model.

The differences in PU levels between the technophile and the non-technophile users in both low-socioeconomic samples solicit a separate examination of the correlations in each group. The correlations between digital literacy and the frequency of Internet use for business purposes (Exp-Bus) are significant for all four groups of subjects, high and low in the frequency of Internet use for fun and communication (Exp-Fun) in both surveys (Appendix 4). However, the correlations between digital literacy and Exp-Fun differ among technophile and non-technophile users. Figures 4.1a and 4.1b exhibit the absence of Exp-Fun correlations with digital literacy for the groups that are high in Exp-Fun, whether among low socioeconomic status groups (Figure 4.1a, ELOST survey) or among the general population (Figure 4.1b, MOF-SIBIS survey). A possible technical explanation for these findings may refer to the narrow range of Exp-Fun values that defines the technophile groups, only the 75-100 percentiles of all subjects. Notwithstanding and in line with the suggested technophilia model, the correlation between Exp-Fun and digital literacy is significant and high specifically for the non-technophile users, those users who do not usually use the Internet for entertainment (low in Exp-Fun). At the same time, Exp-Fun is not correlated with digital literacy among technophile users who frequently use the Internet for entertainment and communication. In other words, the extent of digital literacy among technophile users is no longer dependent on their Exp-Fun level but rather enables it;

and it is their digital literacy that enables them to engage in these activities resulting in higher frequency of Internet use for the purpose of entertainment.

Studying published findings, a clear picture is revealed. Evidence is drawn mainly from comparisons between new and experienced Internet users in developed countries. According to the Digital Future Report (Annenberg, 2005), new users spend a larger percentage of their Internet time playing games while experienced Internet users report much higher levels of work at home for their jobs. As expected and in accordance with the technophile's features, entertainment plays a key role in technology adoption.

In addition, there is an interesting increase in the correlations between Exp-Fun and digital literacy: from the MOF-SIBIS group of high Exp-Fun subjects that shows higher correlations with respect to the other groups; to the ELOST group of low Exp-Fun subjects that shows the lowest correlations with respect to other groups (Table 4.1), as if the correlation depends upon the socioeconomic and Exp-Fun levels. This tendency might be explained as a gradual dependence of digital literacy on Exp-Fun, being less prominent in low socioeconomic levels.

The increasing dependence of the user's digital literacy on entertainment contributes to the uniqueness of the technophile users as enjoyment-driven adopters of technology. For the non-technophile users, this dependence suggests that there is a stage of technology adoption that could be described as a crossroad of conflicting desires, to both draw near (approach) technology and to avoid it. Exposure to and acquaintance with online entertainment is the key factor determining technology adoption, especially among less literate users from low socioeconomic groups. By reframing technology adoption factors, this study aims at including deeper

psychological antecedents and consequences in the adoption process, extending it to new contexts (Benbasat and Barki, 2007; Schwarz and Chin, 2007).

4.1 The techno-complex

A conflict between attraction and fear, the simultaneous philia and phobia related to technology, is the core of the emotional complex introduced here. This emotional crossroad may be a crucial stage in the adoption process. Thus, the re-inclusion of emotions into the field of technology adoption suggests that not only enjoyment should be investigated in this context but so should aversion.

The approach-avoidance conflict (Lewin, 1935) explains the psychological tension created by the conflicting desires to approach and to avoid a single object simultaneously. Although the potentially negative consequences of reaching the desirable object are not real, this pattern of fear is expected to arise whenever the desired object is closer and more concrete (Lewin, 1935). Approach-avoidance conflict has been studied in various contexts (Mehrabian and Russell, 1974), including acceptance research, mainly in the context of online shopping (Porat and Tractinsky, 2008).

The ***techno-complex*** concept, suggested here, emphasizes the psychological struggle accompanying the process of technology adoption while the new user is still involved in the initial phase of experience acquisition. Resolving this ambivalence and leading individuals beyond the emotional crossroad is a psychological challenge. Entertainment can encourage the avoiding user to overcome the techno-complex and to engage in technology. The positive attitude, gained by using entertaining applications, is a key in conquering the fear, resolving the techno-complex, and, for the technophile users, explaining successful adoption by rewarding experience.

In the context of technology adoption, many acceptance models refer to the perceptions of usefulness, ease of use or trust but not to predisposed emotions, whether enthusiasm or fear, as predominate motivation. Those studies that do consider emotions have focused only on one aspect of the process, either the fear of technology (uncertainty avoidance and technophobia) or the successful adoption of technology (self-efficacy), but have not grasped the conflict from both ends. The approach-avoidance conflict manifested in the techno-complex constitutes a psychological barrier that may block new adopters on the one hand while providing intrinsic motivation on the other.

This new focus may assist us in understanding which factors or predispositions initiate positive feelings toward technology usage (Fishbein and Ajzen, 1975) or the desire to use technology (Fortin et al., 1997) in the first place – two occurrences which allow for the required experience to take place (Dickson et al, 1975; Ahituv, 1989; Davis, 1989; Moore and Benbasat, 1991; Venkatesh et al, 2003). This new focus may promote technology adoption on the part of non-technophile users by avoiding negatively perceived solutions (*e.g.*, mandatory use) and by encouraging positively perceived, and thus successful, solutions. The key lies in the main features of the technology, its playfulness and the collaboration that it affords, which are responsible for the emergence of technophilia. By emphasizing these unique traits, playfulness and collaboration, the techno-complex can be resolved in a positive way leading to a successful life-long adoption of technology.

Playfulness in this research emerges as an emotional thrust for technology adoption and digital literacy from the perspective of ergonomics, aesthetic design, or affective human-computer interaction (HCI; Hudlicka, 2003; Picard et al., 2000; Picard and Klein, 2002; Picard, 2003; Teeni, 2007). Writers on the topic of technological

innovation have emphasized the significance of play, pleasure, and the satisfaction from overcoming challenges, winning games or just playing games – over working (Basalla, 1988).

The role of collaboration and openness, as shown in this research, is perceived to be valuable, particularly in light of the abundance of channels for online communications, and assuming that the user is not necessarily using a computer alone. The centrality of social contact was found to be prevalent, as more than three-quarters of teenagers play games that involve interaction with others. Moreover, 65% of teenagers play with individuals who are in the same room with them at the time, and 24% play with individuals with whom they connect online. These teenagers tend to be more civically engaged, contributing web-based content and communicating with others (Pew Internet and American Life Project, 2008). Another Internet survey found that high Internet usage did not decrease the time spent in socializing face-to-face with friends and with family (Annenberg, 2005). And so, if the purpose of the technology is to communicate, then communication must be the task that enhances its adoption ("the proof of the pudding is in the eating", as attributed to Cervantes in *The History of Don Quixote*, and not "in the pudding" itself). This suggested relationship between technology adoption and social engagement received additional support from recent studies, for example, that of Marko, Skoric, and Kwan (2010) who investigated whether Facebook and video games promote political participation among youth in Singapore. The role of positive emotions and enjoyable activity is of special interest in the new web 2.0 practice of sharing (Brynjolfsson and Saunders, 2009; Nov, 2007; Noveck, 2009). Bottom-up mechanisms of user engagement and civic participation are changing the ways by which we create, consume, and manage as well as ways by which we are influenced or by which we pay for information. The current study offers

a model and supporting evidence for an emotional aspect of motivation and behavior with respect to technology adoption (LeDoux, 1996; Ortony and Turner, 1990).

5.0 Summary

The current study shows that the use of technology for entertainment and communication simply for the sake of enjoying its capabilities appears to be an influential contributor in enhancing digital literacy, especially among members of low socioeconomic status groups. By studying Internet usage in surveys among the general population and in specific groups of low socioeconomic status, as in this research, the proposed technophilia model and research questions benefit from greater generalizability across contextual and individual factors.

Such a view reinforces the need to look upon the adoption of technology as a process that extends beyond the initial phase of acceptance to a continued experience of acquirement. In Benbasat and Barki's (2007) terms, the antecedent is the enjoyment (playing games, downloading applications, communicating, etc.) and the consequences are digital literacy, computer self-efficacy, and the gaining of experience and a deep understanding of the technology. Achieving digital literacy would thus be perceived as a continuous goal in the lifecycle of technology usage (Schwarz and Chin, 2007). It is suggested that the specific goal of each technology usage should be the subject of future research, applying the concepts developed in this study to specific contexts.

According to the technophilia definition, the technophile individual perceives the usefulness of technologies in a realistic manner (realistic PU). This study finds that technophile users tend to present relatively low and varied levels of PU, as hypothesized. The technophile-minded user is expected to perceive the usefulness of

technologies "with reasoning" (Fichman, 2004: 337-339), based on the experience. Enthusiasm plays its role at the beginning of the adoption process, encouraging the new adopter to gain experience, after which the user is much more selective and specific, and may become an expert. An unpublished study that applied the model in the context of e-government has proved its viability (Purian, Ahituv and Ein-Dor, in press). Moving from the individual user in a general context to managers within organizations, the technophile manager, as well as the technophile user, can be portrayed according to levels of entertainment (implying sophistication), communication (implying openness) and predicted PU (expressed as mindfulness). The mindful decision-maker is presumed to apply realistic PU; and thus may not necessarily be highly satisfied or attribute high value to IS (Ahituv, 1989; Abrahamson, 1991).

The tendencies to playfulness and openness not only match two popular online activities, entertainment and communication, but well accord with a double-axis potential key to technology: the sophistication that is required in order to enjoy playful activities, overcome challenges, and win on the one hand, and the openness that is required to enjoy communication with others, on the other. By distinguishing these activities, the new model echoes other studies and models.

This study has introduced new theoretical concepts and provided support for their viability. Theoretical implications lie in the application of the new concept of ***techno-complex*** that has emerged from the well-studied approach-avoidance conflict. Another theoretical contribution, supported empirically, is the differentiation of the levels of ***perceived usefulness*** (subjective value of information or user satisfaction) according to the user's experience and mindfulness. These implications may

contribute to learning theories as well as to theories regarding motivation and management.

In terms of differentiation and novelty, this research deepens the understanding of ***enjoyment*** as an antecedent of ***perceived usefulness*** (Sun and Zhang, 2006b). Expanding the view of technology adoption to the entire usage lifecycle holds promise, potentially leading to future research in other contexts (from the individual user to the individual manager) or goals (understanding of concepts such as ***human*** and ***social capital***, ***digital divide***, ***productivity***, ***deliberative democracy***, and other important concepts).

The practical contribution of this study is mainly its potential to create actionable managerial insights for workers' engagement strategies. The contribution should be at the level of the individual first, promoting online entertainment and communication web-tools as means for technology adoption and economic development (Parente and Prescott, 1994).

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Appendix 1: Variables and survey items

ELOST

The ELOST survey items were grouped by variables according to their accepted construct in literature as well as by factor analysis (Rotated Component Matrix, a rotation converged in seven iterations with Principal Component Analysis extraction method and Varimax rotation method with Kaiser Normalization; Hair et al, 2005). Age was recoded on a 3-point scale (15-34; 35-54; 55+). All other variables were recoded on a 2-point scale. Table 1.1 presents the survey items and the variables.

Table 1.1 Variables and survey items: ELOST

Variable	Operationalization	
Perceived Usefulness*	**I will read you a list of statements about e-government. Please tell me whether you agree completely, agree somewhat, or do not agree at all.**	
	are faster than traditional means of interaction with public authorities (*i.e*. post, fax, telephone, personal)	
	make it possible to deal with authorities at more convenient times	
	make it possible to deal with authorities at more convenient locations	
Perceived Ease of Use*	**I will read you a list of statements about e-government. Please tell me whether you agree completely, agree somewhat, or do not agree at all.**	
	are difficult to use without human support	
	are difficult to use without online support	
	are more complicated to use than traditional services	
Experience*	**The Internet can be used for various activities. I will read some to you. For each item, please tell me whether:** you are aware of and regularly use; you are aware of but do not regularly use, or have never heard about. 'Regular use' should be left to subjective interpretation.	
	Exp-Fun	Exchanges over chat rooms or online forums
		Playing or downloading games, images, or music
	Exp-Bus	Obtaining information from public authorities
		Obtaining official forms
		Submitting filled forms
		Interacting with tax office (*e.g.* for income tax return)
		Making payments to public authorities
		Request passport, driver's license, birth certificates, and other personal documents
		Car registration

		Declarations to police (for example, reporting stolen items)
		Registering change of address
Digital Literacy*	**How confident are you about your skills in doing the following using the Internet?**	
	Using Internet to make telephone calls	
	Creating a personal website	
	Downloading and installing software on a computer	
	Identifying the source of information provided on Internet	
	Using the websites of governmental organizations for interacting with public authorities	
	Understanding the content of websites in general	
	Using e-mail to communicate	
	Using a search engine like Yahoo or Google to find information	
Age	Recoded on a 3-point scale (15-34; 35-54; 55+)	

* Variables recoded on a 2-point scale.

MOF-SIBIS

The SIBIS survey items were grouped by variables according to their accepted construct in the literature as well as by factor analysis (Rotated Component Matrix, a rotation converged in seven iterations with Principal Component Analysis extraction method and Varimax rotation method with Kaiser Normalization; Hair et al, 2005).

Various alternatives could be employed to scale variable values. Eventually, we employed dichotomous scaling, weighting the values of 'confident' or 'not confident'. Using this weighting, it was possible to differentiate persons somewhat confident in the skill from persons who were not confident in the skill. Variables were recoded on a 2-point scale, with the exception of Age, which was recoded on a 3-point scale (15-34; 35-54; 55+). Table 1.2 presents the survey items and variables.

Table 1.2 Variables and survey items: SIBIS

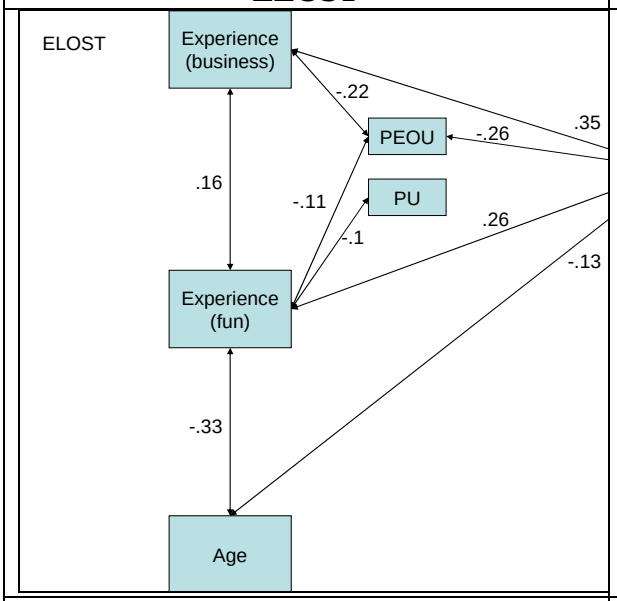
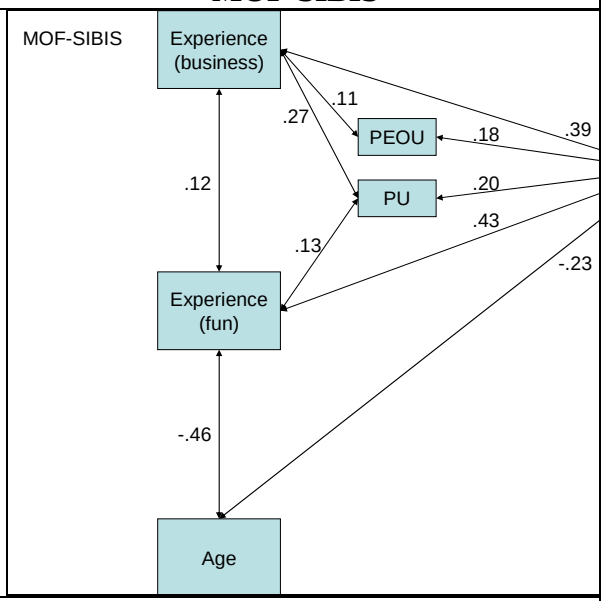
Variable	Operationalization
Perceived Usefulness*	Belief that information on the Internet is personally beneficial as a consumer or client.
	Belief that information on the Internet is personally beneficial as information source for work.

	Belief that information on the Internet is personally beneficial as information source for maintaining work and business relationships.
Perceived Ease of Use*	Perception regarding lack of skills as a potential barrier to Internet use.
	Perception regarding lack of ease of access regarding the Internet.
	Perception regarding efficiency of the Internet – the time aspect.
Exp-Fun*	Playing or downloading games, images or music.
	Exchanges over instant messaging.
	Confidence in communicating over the Internet in chat-rooms.
	Confidence in downloading and installing software onto a computer.
Exp-Bus*	Buying services or products over the Internet.
	Communicating over the Internet by email.
	Confidence in communicating over the Internet by email.
	Searching information on the Internet in various areas (such as s news, studying, entertainment and more).
	Usage of on-line Government Services by citizens.
Digital Literacy*	Confidence in using Internet search engines, finding information on the Internet on a specific topic, of which your interest is raised somehow.
	Confidence in identifying the source of information on the Internet.
	Confidence in communicating by VoIP.
	Confidence in creating a personal web/Internet page.
Age	Recoded on a 3-point scale (15-34; 35-54; 55+)

* Variables recoded on a 2-point scale.

Appendix 2: Correlations and t-test results for technophile vs. non-technophile users

Figure 2.1 Correlations

ELOST	MOF-SIBIS
	
Hypotheses refuted or confirmed (figure above) ***1. Hypotheses set 1.1*: correlations with Exp-Fun** ☑ a. Exp-Fun is **not** correlated with PU (r = -.106, α<0.05, n=515). The correlation is low. ☒ b. Exp-Fun is correlated with PEOU (r = -.089, α<0.05). ☑ c. Exp-Fun is correlated with digital literacy (r = .262, α<0.01). ☑ d. Exp-Fun is correlated with age (r = -.33, α<0.01). ***2. Hypotheses set 1.2*: correlations with Exp-Bus** ☑ a. Exp-Bus is **not** correlated with PU (r = .029, α>0.05). ☑ b. Exp-Bus is correlated with PEOU (r = -.222, α<0.01). ☑ c. Exp-Bus is correlated with digital literacy (r = .351, α<0.01). ☑ d. Exp-Bus is **not** correlated with age (r = .103, α<0.05).	**Hypotheses refuted or confirmed** (figure above) ***1. Hypotheses set 1.1*: correlations with Exp-Fun** ☑ a. Exp-Fun is **not** correlated with PU (r = .126, α<0.01, n=640). ☒ b. Exp-Fun is correlated with PEOU (r = .049, α>0.05). ☑ c. Exp-Fun is correlated with digital literacy (r = .431, α<0.01). ☑ d. Exp-Fun is correlated with age (r = -.457, α<0.01). ***2. Hypotheses set 1.2*: correlations with Exp-Bus** ☒ a. Exp-Bus is **not** correlated with PU (r = .267, α<0.05). • b. Exp-Bus is correlated with PEOU (r = .106, α<0.01). • c. Exp-Bus is correlated with digital literacy (r = .393, α<0.01). ☑ d. Exp-Bus is **not** correlated with age (r = .024, α>0.05).

T-test for technophile vs. non-technophile users

The sample was divided into two groups according to their level in Exp-Fun factor (only subjects whose scores in Exp-Fun are in the 75-100 percentile are included in the technophile users group). T-test revealed differences between the groups with respect to PU, PEOU, experience, digital literacy, and age.

Table 2.1 Group statistics: ELOST

	ExpFunDicho	N	Mean	Std. Deviation	Std. Error Mean
PU	.00	194	.9253	.20640	.01482
	1.00	321	.8681	.25837	.01442
PEOU	.00	192	.5729	.39911	.02880
	1.00	321	.5000	.39441	.02201

	ExpFunDicho	N	Mean	Std. Deviation	Std. Error Mean
Exp	.00	212	.1243	.18108	.01244
	1.00	344	.1858	.23518	.01268
Literacy	.00	204	.6973	.26003	.01821
	1.00	341	.8050	.20669	.01119
age 3 categories	.00	207	1.8357	.69818	.04853
	1.00	342	1.4211	.61116	.03305

Table 2.2 T-test for equality of means (Levene's test for equality of variances): ELOST

Factor	**Variance**	**t value**	**Exp-Fun**	**N**	**Mean**	**Std. deviation**
PU	Equal variance **not** assumed, F=21.388, P<.001	t(474.814)=2.763, p<0.01	Low High	194 321	.93 .87	.21 .26
PEOU	Equal variance assumed, F=.013, P>.5	t(511)=2.017, p<0.05	Low High	192 321	.57 .50	.40 .40
Experience	Equal variance not assumed, F=13.145, P<.001	t(527.22)=3.459, p<0.01	Low High	212 344	.12 .19	.18 .23
Literacy	Equal variance assumed, F=23.656, P<.001	t(355.167)=5.042, p<0.01	Low High	204 341	.70 .80	.26 .21
Age	Equal variance assumed, F=.637, P>.5	t(547)=7.298, p<0.01	Low High	207 342	1.84 1.42	.70 .61

Hypotheses refuted or confirmed

☑ ***3. Hypotheses set 2.1*: Quality of means** (Table 2.2)

Compared to the group of low Exp-Fun subjects, the group of high Exp-Fun subjects:

a. Has higher means in **PU** t(474.814)=2.763, p<0.01

b. Has higher means in **PEOU** t(511)=2.017, p<0.05

c. Has higher means in **Exp-Bus** t(527.22)=3.459, p<0.01

d. Has higher means in **digital literacy** t(355.167)=5.042, p<0.01

e. Has lower means in **age** t(547)=7.298, p<0.01

☑ ***4. Hypotheses set 2.2*: Equality of variances** (Table 2.2)

a. The group of high Exp-Fun subjects has higher variances in **PU**, compared to the group of low Exp-Fun subjects: Equal variance **not** assumed, F=21.388, P<.001.

b. For all other variables, equal variance is assumed.

Table 2.3 Group statistics: MOF-SIBIS

	Exp-Fun	N	Mean	Std. Deviation	Std. Error Mean
PU	**0**	363	.5964	.37601	.01974
	1	277	.6739	.34483	.02072
PEOU	**0**	346	.5814	.32458	.01745
	1	264	.5896	.30791	.01895
Experience	**0**	371	.6027	.28459	.01478
	1	280	.6482	.25399	.01518
Digital Literacy	**0**	352	.3996	.27654	.01474
	1	274	.6034	.23646	.01429
Age	**0**	339	1.8053	.77527	.04211
	1	204	1.1961	.48706	.03410

Table 2.4 T-test (Levene's test for equality of variances): MOF-SIBIS

Factor	Variance	t value	Exp-Fun	N	Mean	Std. deviation
PU	Equal variance assumed, F=8.591, P<.005	t(638)=2.676, p<0.01	Low High	363 277	.5964 .6739	.37601 .34483
PEOU	Equal variance **not** assumed, F=1.264, P=.261	t(580)=.320, p>0.5	Low High	346 264	.5814 .5896	.32458 .30791
Experience	Equal variance assumed, F=4.544, P<.005	t(649)=2.115, p<0.05	Low High	371 280	.6027 .6482	.28459 .25399
Digital Literacy	Equal variance assumed, F=8.601, P<.005	t(624)=9.738, p<0.01	Low High	352 274	.3996 .6034	.27654 .23646
Age	Equal variance assumed, F=103.164, P>.001	t(541)=10.088, p<0.01	Low High	339 204	1.8053 1.1961	.77527 .48706

Hypotheses refuted or confirmed

☑ ***3. Hypotheses set 2.1*: Equality of means (Table 2.4)**

Compared to the group of low Exp-Fun subjects, the group of high Exp-Fun subjects:

a. Has higher means in **PU** t(638)=2.676, p<0.01

b. Does not have higher means in **PEOU** t(580)=.320, p>0.5

c. Has higher means in **Exp-Bus** t(649)=2.115, p<0.05

d. Has higher means in **digital literacy** t(624)=9.738, p<0.01

e. Has lower means in **age** t(541)=10.088, p<0.01

☒ ***4. Hypotheses set 2.2*: Equality of variances (Table 2.4)**

a. The groups with high and low Exp-Fun subjects have equal variances in **PU.** Equal variance assumed, F=8.591, P<.005

b. For all other variables, equal variance is assumed, except for **PEOU**, F=1.264, P=.261

Appendix 3: Results for MOF-SIBIS-LSG sample

The low socioeconomic group (LSG) in the MOF-SIBIS sample was defined according to ELOST criteria. Applying all three criteria resulted in small groups of 4-9 subjects in each cell. Reducing the criteria increased the sub-sample to *n*=96 but the numbers of subjects in each cell remain low, 13-14 in most cells.

Low socioeconomic level was defined as persons with low income who also display one or more of two (not three) additional characteristics: education and employment (occupation was excluded for lack of consistency in measurement between the MOF-SIBIS and ELOST surveys). Low income was defined as equal to or lower than the average household income in Israel in 2005, the year at which the survey took place, according to the Central Bureau of Statistics (CBS, 2005: 13). Table 3.1 presents the differences in LSG criteria.

Table 3.1 ELOST LSG criteria adaptation to MOF-SIBIS survey

Criterion	**ELOST** (2007a: 12)	**MOF-SIBIS**
Base criterion: Low income household	Low income household is defined as 50% or below the average or median household income in the country.	Low income household is defined as NIS 10,600 or less (*n*=96) otherwise the sample is reduced to 76 respondents, with up to 9 subjects for each cell (under the criterion of NIS 6,400 or less).
Additional criterion*: Education	Low educational level (i.e. without a completed high school diploma).	Identical
Additional criterion*: Unemployment	Unemployed for six months or more.	Identical
Additional criterion*: Low-skill occupation	Low-skill occupations, following ISCO classification.	Criterion excluded, since values in the MOF-SIBIS survey do not support the required differentiation (Farmer; liberal profession; or business-owner, workshop, shop, company).

* The additional criteria (at least one matching is required).

The MOF-SIBIS-LSG sample comprises 96 respondents as defined in Table 3.1.

Correlations in the model are presented in Figure 3.1.

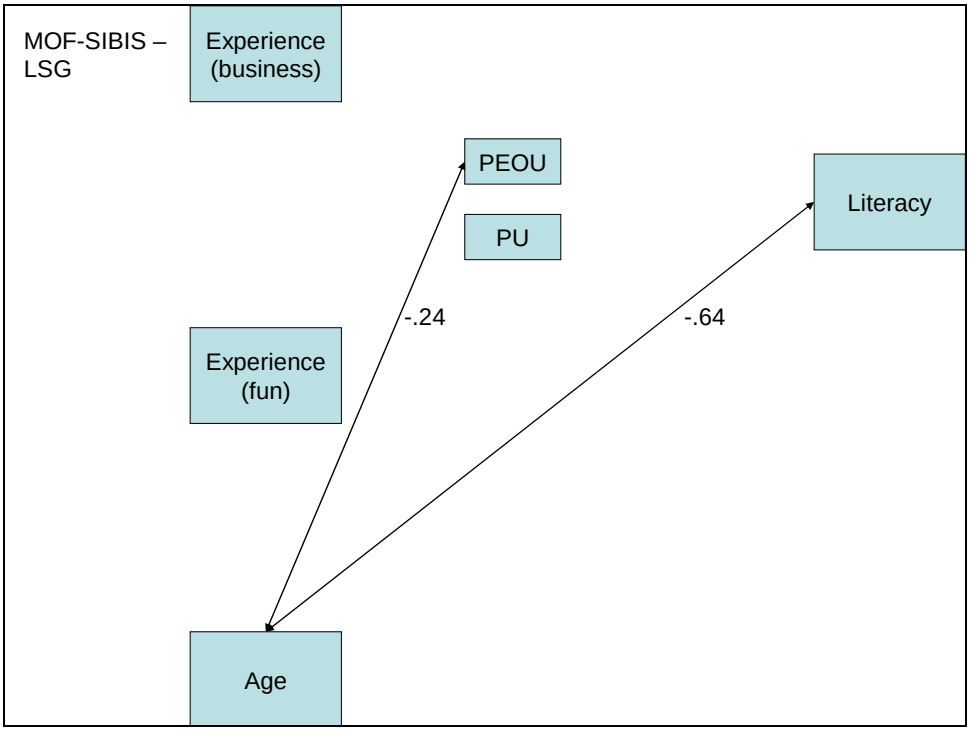


Figure 3.1 Correlations: MOF-SIBIS-LSG*

***** Correlations are low due to small number of subjects in this group (*n*=96), in most cells *n*=13; for the correlation between age and digital literacy *n*=14; for age and PEOU *n*=90. High but non-significant correlations include: Exp-Fun and digital literacy, r=.505, *n*=14; Exp-Fun and age, r= -.382, *n*=14; Exp-Bus and PU, r=.41, *n*=14; PEOU and digital literacy, r=.49, *n*=13.

Hypotheses refuted or confirmed

Probably due to the low number of subjects in the MOF-SIBIS-LSG reduced sample, only two correlations may hold significance: the correlation between age and PEOU, where *n*=90, and the correlation between age and digital literacy, where *n*=14.

Mann-Whitney test for technophile vs. non-technophile users

Table 3.2 Mann-Whitney test for equality of mean rank MOF-SIBIS-LSG

Factor	**Mann-Whitney U**	**Exp-Fun**	**N**	**Mean rank**
PU*	U=10.5, Z= -1.665, p=0.096	Low High	9 5	6.17 9.90
PEOU	U=4, Z= -0.637, p>0.5	Low High	9 4	7.44 6.00
Experience	U=15, Z= -1.019, p=0.308	Low High	9 5	6.67 9.00
Digital literacy*	U=9.5, Z= -1.865, p=0.062	Low High	9 5	6.06 10.10
Age	U=13, Z= -1.442, p=0.149	Low High	9 5	8.56 5.60

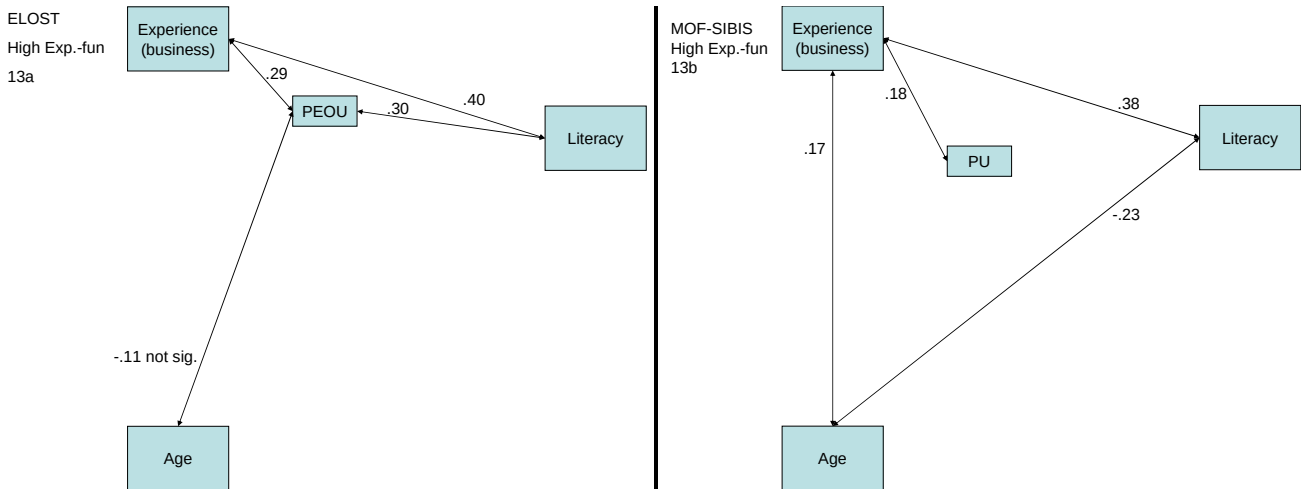
* Mann-Whitney U is significant.

Hypotheses refuted or confirmed

The sample size allowed for a comparison between technophile and non-technophile users (4-9 subjects in each cell). The Mann-Whitney test for equality of mean rank revealed significant results for PU and digital literacy ($p<0.1$). This finding supports the technophile model, proposing significant differences in means between the technophile and the non-technophile users concerning the important variables PU and digital literacy.

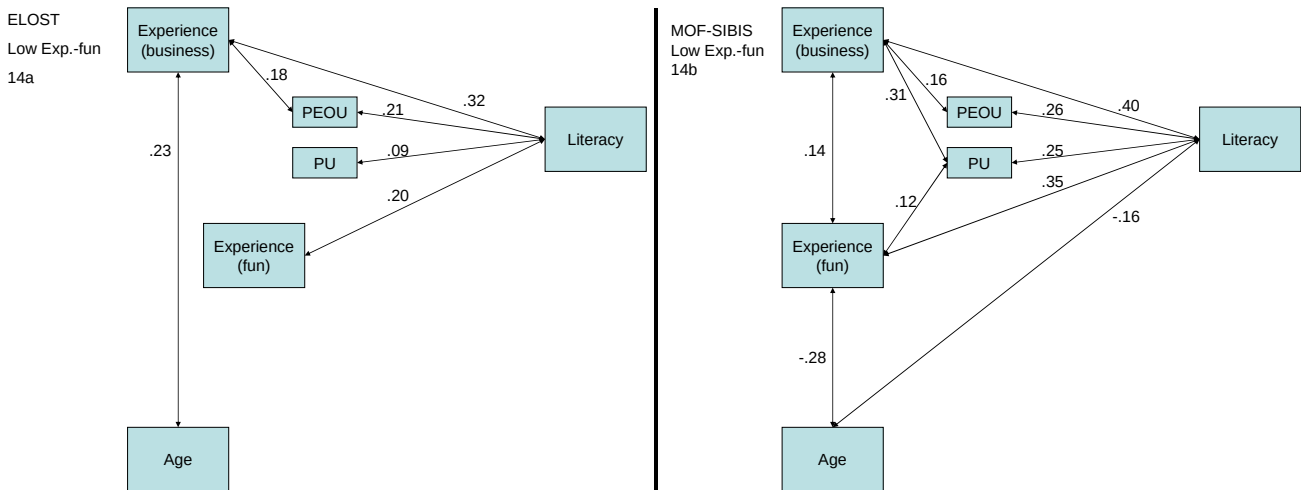
Appendix 4: Correlations for technophile vs. non-technophile users

The ELOST and MOF-SIBIS samples were divided into two groups according to levels in Exp-Fun factor (technophile vs. non-technophile groups). Figures 4.1-4.2 and Table 4.1 present correlation results after this division; all four groups show high correlations between Exp-Bus and digital literacy.



Technophile users (high Exp-Fun) in ELOST survey (4.1a) and MOF-SIBIS survey (4.1b).

Figure 4.1 Technophile users (high Exp-Fun) in the ELOST and MOF-SIBIS surveys



Non-technophile users (low Exp-Fun) in ELOST survey (4.2a) and MOF-SIBIS survey (4.2b).

Figure 4.2 Non-technophile users (low Exp-Fun) in the ELOST and MOF-SIBIS surveys

Table 4.1 presents the correlations between experience and digital literacy for technophile and non-technophile users.

Table 4.1 Correlations for experience and digital literacy

	Non-technophile users (low Exp-Fun)		**Technophile users** (high Exp-Fun)	
	ELOST (low socioeconomic group)	**MOF-SIBIS** (general population)	**ELOST** (low socioeconomic population)	**MOF-SIBIS** (general population)
Exp-Fun, digital literacy	.20	.35	-	-
Exp-Bus, digital literacy	.32	.40	.40	.38