Basic Need Satisfaction and Students' Willingness to Use Spreadsheet Software

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Abstract—The present study was designed to test how fulfillment of three basic psychological needs influence students development of perceived usefulness (PU) and ease of use (EOU) in connection with use of a spreadsheet. Both PU and EOU are assumed to be critical for development of students' willingness to utilize spreadsheet in future work within business administration. A questionnaire was completed by 196 business students in Norway. We found that satisfying the need for competence and autonomy is most critical for willingness to utilize the software package. The results also indicate that satisfying the need for relatedness, surprisingly, has no influence on students' willingness to utilize the software package. A key implication of the present research is that teachers mainly should focus on fulfilling students need for competence and self-determination when the purpose is to motivate them to utilize new software. That students' should develop their own competence when using a new technology is somewhat obvious, but that the feeling of being self-determined needs to be a complementary element in this connection is not necessary seen as obvious.

Keywords—Spreadsheet, business students, technology acceptance, basic psychological needs.

I. Introduction

UNIVERSITY students, studying business administration, use spreadsheet to practice e.g. budgeting, investments analysis and breakeven point analysis. The main purpose of teaching them to use this software package is to provide them with skills that make them qualified to solve economic problems and perform economic analysis in a future job. A necessary prerequisite for students' willingness to use a software package is that they perceive this software package to be useful and relatively easy to use. We also know that fulfillment of basic psychological needs is critical for young employees' job motivation [4]. The Technology Acceptance Model (TAM) describes perceived usefulness (PU) and ease of use (EOU), as the two main drivers of users' willingness to use a software package. We propose that the students' fulfillment of the need for competence, relatedness and autonomy may be important antecedents of their internalization of PU and EOU. Our reason for proposing this is that we believe that satisfying these three basic psychological needs is important for the development of PU and EOU beliefs.

As indicated above, the purpose of the present study is to utilize core variables from TAM [2] to test how critical satisfying the need for competence, relatedness and autonomy

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may be for students' willingness to use a software package in a future job. Prior IS-research has typically investigated the need for competence conceptualized as actual computer proficiency [6]. Our theoretical platform is however, self-determination theory (SDT) where basic psychological needs is conceptualized as need for competence, relatedness and autonomy [3].

The organization of this paper is as follows: In the next section we present and adapt the original TAM and the concept of basic needs from SDT in accordance with the purpose of the present study. Then we describe survey procedures, data analysis and provide the results. In the final section, we discuss the implications of our research findings and suggest some directions for further research.

II. Theory

The technology acceptance model (TAM) consists of five variables; perceived usefulness (PU), perceive ease of use (PEU), attitude toward using, intentions to use and actual use [2]. The short version of TAM consists of three core variables; PU, PEU and intentions to use. In accordance with the purpose of the present study we find the short version of TAM most appropriate.

PU is defined as the degree to which a student believes that using a particular software package would enhance his or her problem solving performance in business administration. EOU is defined as the degree to which a student believes that using a particular software package would be free from effort. And finally, intentions to use are defined as the students' willingness to use a particular software package in a future job.

Self determination theory (SDT) consists of three basic psychological needs that underlies motivation and two main categories of motivation; extrinsic and intrinsic [3]. Motivation within this theory refers to reasons for carrying out an activity which vary along a self-determination continuum, where amotivation (i.e. lack of motivation) and intrinsic motivation (i.e. genuine interest and enjoyment) are the extremities. Extrinsic types of motivation refer to a spectrum of four intermediate regulations, where perceived usefulness is classified as an autonomous form of extrinsic motivation (cf. identification). The fulfillment of all three basic psychological needs, i.e. the need for competence, relatedness and autonomy, is expected to influence the level of motivation. We therefore expect the fulfillment of the need for competence, relatedness and autonomy to influence both PU and EOU beliefs.

Our research model consists of six variables; need for competence, need for relatedness, need for autonomy, PU,

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PEU and intentions to use (cf. Fig. 1). The three psychological needs are expected to be a source to PU, EOU and intentions to use, because students that feel that their basic needs are fulfilled will have a desire to continue to use the software. This is supported by previous research, which has shown that the fulfillment of basic needs (i.e. particularly competence and autonomy) is a significant antecedent of users' acceptance of technology [5].
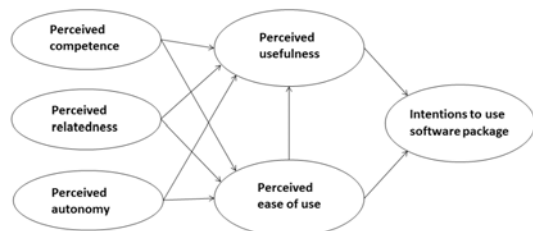

Fig. 1 Conceptual model

III. THE STUDY

A. Sample and Data Collection

The research sample consisted of 196 students in business administration from a University College in Norway. The students were located on two different campuses. All students were in their first semester and participated on an ICT in economics course. The purpose of the course was to learn them to utilize the spreadsheet Excel to perform economic analyses like investments analysis and breakeven point analysis.

To collect data, we developed a questionnaire based on established and widely used measurement instruments (i.e. these are described in the next section). Prior to the distribution of the questionnaire, we refined the instruments through an informal pre-test among students and experienced teacher in business subjects. The interviews resulted in important insights in measurement instruments and wording of items. This test led to some minor adjustments of the questionnaire items, mainly through more precise wording relative to the context chosen. We believe that our use of previously validated instruments together with the process of item improvements resulted in sufficient content validity for all the measurement instruments.

Questionnaire distribution and returns were by ordinary mail. Out of 261 potential respondents, a total of 196 usable questionnaires were collected, for a response rate of 75%. The response rate was not unexpected, since not all students were present in the classroom when we distributed the questionnaire. Fifty-nine percent of the respondents were women. Eighty-seven percent of the respondent was 30 years old or younger.

B. Measurement Instruments

The items used to operationalize the variables in our research model were adapted from the literature, with changes in wording reflecting the IS targeted in our sample and the specific user context. The Instruments on PU were adapted from Bhattacherjee [2], while the EOU and intention to use instruments was adapted from Davis [1]. The three basic psychological needs were measured with an instrument adapted from Roca and Gagé [5]. All items were measured using a seven point Likert type scale, with ''strongly agree" and ''strongly disagree" at each end of the scale.

IV. RESULTS

We used the structural equation modeling (SEM) tool LISREL to analyze the proposed research model. Fig. 2 summarizes the results from the test of the structural model. The effect of the explanatory variables in the research model is represented by the path coefficients followed by asterisk to indicate whether the coefficient is significant. Five out of nine path coefficients in the model had significant t-values (i.e. value > 1.96) and their range is from medium (0.31) to strong magnitude (0.41).

Fitting the model to the sample data resulted in a Chi-Square value of 477.16 (df = 287, p < 0.000), a Chi-Square/df ratio of 1.66, a GFI (goodness-of-fit index) value of .84, and a RMSEA (rootmean-square error of approximation) of .06. The model explains 31% of the variance in students' intentions to use Excel in a future job.
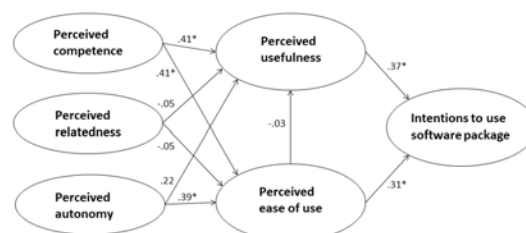

Fig. 2 Results from LISREL analysis

V. DISCUSSION AND CONCLUSIONS

ICT in general, and particularly spreadsheet applications, is a critical tool to prepare business students on the reality they will meet in a future job. In this paper we have investigated how important fulfillment of three basic needs is for development of ICT centric motives as PU and EOU, i.e. the core motives for the development of business students' willingness to utilize a spreadsheet in a future job.

We found support for five out of nine hypotheses in our self-determination theory extended IS-acceptance model. The obtained results suggest that perceived competence and autonomy is important in explaining students' willingness to utilize a spreadsheet in a future job. They explain respectively 29 and 41 percent of PU and EOU. Moreover, thirty-one percent of students' intentions to use spreadsheet were explained by PU and EOU. Based on these findings, the main theoretical implication is that an extension of IS-acceptance theory (i.e. TAM) with basic psychological needs from Self-Determination Theory (SDT) has merit.

Based on the empirical results, some challenging implications for teachers emerge from this study. Most important of all, students' fulfillment of the need for

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competence and autonomy seems to be the most critical factors for their development of PU and EOU perceptions and further their intentions to use the package in a future job.

The main question in this connection is how teachers may facilitate students' development of PU and PEU beliefs. According to self-determination theory, autonomous motivation (e.g. PU) grows when the three basic psychological needs investigated in the present research are covered through the learning process; the need for autonomy, competence and relatedness. This indicate e.g. that teachers' may facilitate students' possibility to self-initiate and self-regulate own behavior as a part of the learning process (cf. autonomy). Possible measures may be to initiate problem and/or project based learning where students' has the possibility to be in charge of their own learning process. That our research did not support the importance of relatedness in this connection may be a result of setting specific conditions. Future research should investigate this issue further.

The results also indicate that PU and EOU are important for students' development of intentions to use a software package in a future job. Teachers' should therefore be aware of students need to understand why a spreadsheet is important for efficient performance of economic analyses and further that they need support to reach a adequate level of proficiency.

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