FACTORS AFFECTING PC USE AMONG AFRICAN YOUTH: EMPIRICAL STUDY FROM ETHIOPIA AND RWANDA

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ABSTRACT
This study attempts to predict the usage of information technology in the school work of the youths in Africa. Collected primary data from two African countries (Ethiopia and Rwanda) are tested against the conceptual model of Thompson, Higgins, and Howell (1991) with the help of structural equation implementation. This is a research in progress. The report explains the foci and the distinguishing aspects of this study, the data collection methodologies, and the challenges that were faced in bridging the barrier of language of communication. Descriptive statistics of the collected data and the future directions in this research are presented.

Keywords
Personal computing, information technology utilization, attitude, behavior, Africa, Ethiopia, Rwanda, Youth

INTRODUCTION
Predicting Information Technology (IT) usage has been an important area of Information Systems (IS) research. Many researchers have demonstrated relationship between attitude and Personal Computer (PC) utilization. However, research conducted in this area mainly focused on the high-income countries of Europe and the Americas as the backdrops. On the contrary, we study the relationship of attitudes and PC utilization in the context of African countries. Secondly, this research significantly differs from other related works in that youths, and not adults are the survey respondents; and that the IT usage in this paper focuses on ‘school work’ and not on ‘work’ related to gainful employment. This paper presents an empirical study from Ethiopia and Rwanda to bridge the gaps that exist in the literature of IT usage in the above two dimensions.

High significance as well as topical popularity of research in technology acceptance and usage is evident in the IS literature. In one of the earliest works that looked into ‘acceptance’ behavior, Triandis (1971) argue that behavior is determined by attitude, social norms, and habits, and is governed by the consequences that are expected in the post-usage scenario. A steady stream of research follows this seminal work, where the above premises are considered in part/full. During the next two decades, as computers increasingly carved up mainstream usage in work place, influential studies of technology acceptance and usage were undertaken - leading to the seminal works and development of the theories of reasoned action (TRA) by Ajzen and Fishbein (1980), technology acceptance model (TAM) by Davis (1989), and innovation diffusion theory (IDT) by Rogers (1995). The advent and proliferation of PCs in the work place and gradual replacement of the mainframe computing environment evoked significant interest among the IS researchers on the usage of PC in the work place.

One important study that looks at the PC usage is that of Thompson, Higgins and Howell (1991). In their work, utilization of a PC is implied in an optional use environment, and the influences are measured in the dimensions of (i) the knowledge workers’ feelings toward PC usage (affect), (ii) the presence of social norms about PC usage in the work place, (iii) the individual habits associated with PC usage, (iv) the individualistic expectation of future outcomes of PC usage, and importantly, (v) the conditions in the work environment that facilitate conditions conducive to PC usage. Compeau and Higgins (1995) further extend/elaborate this work to include additional factor conditions of encouragement and support, as well as self efficacy beliefs of the users and incorporate the negative factor of anxiety as it affects PC usage in work place. In our work we utilize all the constructs from Thompson, Higgins and Howell (1991) as well as the self efficacy construct from Compeau and Higgins (1995) for the following reason: Thompson, Higgins and Howell (1991) model is generally applied for organizational audiences that have professional exposure, which implicitly assumes some homogeneity in their self efficacy of PC utilization. However, we cannot assume such homogeneity in our audience. In fact, our audience, youth from Ethiopia and Rwanda; have a large variation in self efficacy in PC usage. We include the self efficacy construct from Compeau and Higgins (1995) such that we could potentially qualify the PC usage of our audience in the light of this heterogeneity.

In what follows, we describe our research model, the background of our study including our data collection efforts, the initial analysis of the collected data, and our future propensity and direction of research with the collected dataset. This is a research-in-progress; our primary data was collected in the summer of 2008. Currently we have assessed and cleaned the
database, and have commenced on fitting the data in the structural equation model (SEM) which, at its full representation, is fashioned after Thompson, Higgins and Howell (1991).

THE RESEARCH MODEL DRIVING OUR DATA COLLECTION

We adopt the conceptual models proposed in the seminal studies on PC utilization, viz. Thompson, Higgins, and Howell (1991) and Compeau and Higgins (1995) were used to develop the survey instrument. A ninety-six (96) item survey was developed by combining these two studies.

Most of the earlier researches analyzing these models have been done using adults employed at corporations. In contrast, our target audience was youth in K-16. Almost all of our target audience has not yet entered the workforce. Therefore, the context used in our study is school work assigned to students. Furthermore, all three sites where data are collected had community computer centers with free access to the youth. The youth can also access computers at their school.

The conceptual model investigated the relationship of PC utilization from six constructs (Thompson et al.) including social factors influencing PC use, affect toward PC use, complexity of PC use, job fit with PC use, long-term consequences of PC use, and facilitating conditions for PC use. This constituted the second part of our survey instrument (the first part was geared towards collecting background information of the respondents). The measures of these constructs were modified to fit the target audience as we explain below:

Figure 1. Factors Influencing the utilization of PC

Social factors influencing PC use: the four questions for the social factor construct have phrases that include departmental co-workers, senior management, my boss and my job, and organizational support. To fit the context of our target audience appropriate phrases were used. ‘Departmental co-workers’ was substituted with ‘classmates’ or ‘friends’ that attend the same community computer center (or ‘classmates’ in case of a school setting). Senior management of the business was translated to mean the directors of the community computer center (or senior management of the school). The organization was substituted by the community computer center or the school. Attitude toward use and job fit: for these constructs the term work was substituted by school work and job was substituted by class assignment.

Complexity: the wordings for this construct were used as is without any substitution.

Job fit and long-term consequences: the term job was retained for these constructs. Respondents were informed to consider their future employment.

Utilization: the term job related use was substituted by school related use.

Following Thomson et al (1991) we test the same hypothesis:

H1: There will be a positive relationship between social factors concerning PC use and the utilization of PCs.
H2: There will be a positive relationship between affect toward PC use and the utilization of PCs.
H3: There will be a negative relationship between the perceived complexity of a PC and the utilization of PCs.
H4: There will be a positive relationship between perceived job fit and the utilization of PCs.
H5: There will be a positive relationship between perceived long-term consequences of use and the utilization of PCs.
H6: There will be a positive relationship between facilitating conditions for PC use and the utilization of PCs.

The third, i.e. the last part of the survey had additional questions that utilized the model of Campeau et al. The model is represented in figure-2 below.

![Figure 2. Model of Campeau and Higgins](image)

THE STUDY

The data that drives this research comes from a primary study that was funded by Microsoft Inc., USA, in collaboration with the Association of Information Systems (AIS), to promote research. AIS members were solicited to consider Microsoft funded project around the world, and propose research topics for a competitive bid. Selected proposals were funded to conduct research. One of the authors won and conducted the primary study in Ethiopia and Rwanda. An entrepreneurship center in Bahir Dar, Ethiopia and a youth center in Kigali, Rwanda were the focus of this research. The study focused on Personal Computer (PC) acceptance among youth in low-income countries.

Target groups and survey administration

Survey Data were collected from both the centers funded by Microsoft, (i.e. Bahir Dar, Ethiopia and Kigali, Rwanda, both charitable organizations). In order to expand the study, a third center, (NOT funded by Microsoft, but operates in a similar way with charitable organizations, and focuses on youth) was selected in Addis Ababa, Ethiopia.

Five groups among the three centers participated in the study. The five groups were:

- **Group 1: Bahir Dar, Ethiopia** – advanced. This group comprises high school graduates who have completed eighteen months of entrepreneurship training, putting them in the ‘advanced’ standing. These students have access to computers on a daily basis.

- **Group 2: Bahir Dar, Ethiopia** – beginners. This group is composed of high school graduates who have just begun their entrepreneurship program, and are in their third month of training, putting them in the ‘beginner’ standing. The students have just begun experiencing their exposure to personal computers.

- **Group 3: Kigali, Rwanda** – advanced. This group is composed of mostly high school students that are identified for the Microsoft funded computer training facilities/programs, and hence considered ‘advanced’. These students have access to computers on a daily basis.

- **Group 4: Kigali, Rwanda** – beginners. This group consists of the general youth that come to the youth center. These students have limited access to computers.

- **Group 5: Addis Ababa, Ethiopia**. On an average 150 youth attend this FREE computer center. This group is composed of the general youth that come to the computer center of the charitable organization.

The survey for all participants was administered in person using paper and pencil collection method.

The survey for groups 1 and 2 was administered together at the same time. The program administrator of these groups was informed by the Microsoft country representative about the research agenda, and a visit was scheduled with of one of the

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1 Both funded by Microsoft
researchers. The program administrator coordinated with the teachers to bring students at one single location for the survey. All the students of both the groups participated in the survey. The survey, written in English, was distributed to each participant. However, for recording the responses, special care was taken:

Although many of the students spoke English, the survey was verbally translated to the native language to help students fill-out their survey with no misgivings. The researcher spoke the native language and translated each question to Amharic, the native language. Students were instructed not to write their name on the survey forms to retain the anonymity of the data collection. Participants were given adequate time to record their response after each question was being translated in their native language. The responses were further codified # 1 or 2 to identify their level as advanced, and beginner. The survey administration took about 45 minutes. About 50 participants took part from this location. This survey was conducted in early May, 2008.

The survey for groups 3 and 4 was conducted in Kigali, Rwanda in mid May, 2008. The Kigali center serves over 500 youth. The services provided at this center are au gratis. This center has youth activities including sports and social and academic clubs. The Microsoft funded computer center is one of the activities at this youth center. The program director was informed by Microsoft personnel about the research agenda and the visit was scheduled visit with the researcher. The morning the survey was administered; the director used the public announcing system to inform students about the survey and encouraged students to gather in the auditorium to participate. About half of the youth who were present at the time, about 200, gathered for the survey. Some youth spoke English, but to facilitate proper communication of understanding of the instrument, the survey was translated into their native language, Keya-Rwanda. The researcher did not speak Keya-Rwanda, therefore two instructors from the center were first selected to translate from English to Keya-Rwanda. The researcher would first read the questions in English, which will then be followed by the instructors’ translating them into Key-Rwanda. The translators alternately covered consecutive questions of the survey.

Students were informed about the survey purpose and instructed to indicate their group number on the survey form with no names. Students were given time to record their responses in a paper—pencil survey format. The survey took two and a half hours (2.5 hours): the longer time was attributed to the size of the participants, over 200, combined with the 2-stage complex translation process. The English to Keya-Rwanda translator’s unfamiliarity of the survey material also attributed to the lengthy duration of the survey.

To encourage participation, an incentive in the form of a lottery was used. Participants were informed about a cash prize of 10,000 shillings in the local currency; equivalent of an average weekly salary if they could match some arbitrarily pre-selected winning numbers. Likewise, at the end of the survey participants were asked to write a number from 0 to 50 on a piece of paper and the researcher and instructors agreed on a random number as the winning number. Once participants wrote their numbers, the researcher and instructors checked the number each student has written and identified those participants who had actually matched the selected winning number. Eleven participants matched the selected number. The cash reward was awarded to these eleven participants. The translators also received payment for their service.

The survey for the 5th group was conducted in Addis Ababa, Ethiopia, end of May 2008. The administrator of the charitable organization was informed about the study and subsequently agreed to participate. Unlike the above two survey, youth who use the computer center at this charitable organization came on their preferred times. Many of them came 2-3 times a week. A notice was put out ten days before the scheduled survey day, which also briefly explained the nature and the purpose of the survey. A signing sheet was put at the front desk of the computer center. To encourage participation, a reception at the end of the survey was announced in advance. About 50 participants attended the survey. The researcher spoke the native language, Amharic. The researcher translated each question to the native language. Participants were given adequate time in between questions to record their response. The survey took 45 minutes. Students were informed about the purpose of the research and instructed to write a code for their group without any names.

In total, 239 responses were collected from all the above surveys.

INITIAL ANALYSIS OF SURVEY RESPONSE

The 239 responses were divided in 5 groups that we have discussed earlier (Table 1). Females were well represented in the study (Table 2).
While 68% of the respondents were in the 14-18 years of age, nearing the time when they will join the work force (Table 3), 60% of them has a high school education (Table 4).

While participants’ desire for their future professions was distributed all over, a very large section (65%) indicated their preference for business (Table 5).

Because we were interested the respondents propensity for computer usage, we asked specifically about the productivity tools in computer usage that they were using in doing their work. Specifically, we asked the questions “How do you rate your knowledge of the following software (Where 1 indicates “No knowledge at all” and 7 indicate “Excellent Knowledge”).
Participant responded on six productivity tools including Word Processor (like MS Word), Presentation tool (like PPT), Spreadsheet (like MS Excel), Database (like MS Access), Internet, and Email. Seven point Likert scale was used. The responses in percent are shown in Table 6.

<table>
<thead>
<tr>
<th>Lickert Scale</th>
<th>Word Processor</th>
<th>Presentation Tool</th>
<th>Spreadsheet</th>
<th>Database</th>
<th>Internet</th>
<th>Email</th>
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<td>25.5</td>
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<td>36.4</td>
<td>46.0</td>
<td>31.4</td>
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<td>10.9</td>
<td>8.4</td>
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<td>7.1</td>
<td>5.9</td>
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<td>9.6</td>
<td>6.3</td>
<td>11.3</td>
<td>10.5</td>
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<tr>
<td>7. Excellent Knowledge</td>
<td>19.2</td>
<td>13.4</td>
<td>15.5</td>
<td>8.8</td>
<td>18.4</td>
<td>20.9</td>
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<td>1.7</td>
<td>4.6</td>
<td>3.8</td>
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<td>Total</td>
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<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 6

CONCLUDING REMARKS AND FUTURE WORK

In this work we attempt to extend the extant prudence of IT usage in work in two different dimensions. We delve to understand the factors of IT usage for school related work in groups of students who are still years away from joining the work force of the economy. Secondly, in contrast to the earlier studies which study IT usage in workplaces in high-income countries, the respondents of our study are from the low-income countries of the African Continent. Our data collection phase is complete now, which has yielded a sizable number of analyzable responses. We have commenced on data analysis but our analysis is still in a very nascent stage. The descriptive statistics suggest that we have been able to capture a diverse dataset, where variances could be expected to statistically explain the factors of influence in predicting IT usage of these youth in the African countries. We found strong government support for IT in the countries where we collected data. The governments of Ethiopia and Rwanda promote the use of ICT at the highest level, and the general perception in these countries is that ICT can help them advance in terms of economic progress. We felt similar sentiment from our youth group. Given their age, the youths are highly positive about the future of ICT. Adding this to the overall upbeat expectation of ICT at the national level, we expect all of the hypotheses of our research to be supported by our target group.

Collecting data from countries and institutions far away, whose values and beliefs are much variegated, offered challenges. Major challenges included getting contact information for projects and being in touch with the person responsible for those projects. Ethiopia and Rwanda have fewer Microsoft presence compared to other regions, this made it even more challenging to identify project contacts. Another level of challenge stared at our study in terms of the language barrier - hiring cost-effective yet efficient translators for Kinyarwanda, and manage the surveys through the complex 2-step translation process in a timely fashion was an high-adrenalin endeavor.

REFERENCES