# An Empirical Investigation of Technology Readiness Among Working Professionals in Ethiopia

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## Abstract

**Technology readiness as a concept offers an impetus for researchers and practitioners to gain customers' readiness to embrace and interact with technology in a more comprehensive manner. The Technology Readiness Index (TRI) scale has been widely used to assess technology readiness in a variety of countries and cultures. However, there are a limited number of studies which have focused on developing countries such as Ethiopia to explore the people-technology interaction. Ethiopia is one of the fastest growing economies of Africa, and hence, insights into Ethiopian consumers is important to the global marketplace. At the same time, with macroeconomic changes, Ethiopian consumers would also move from traditional to mainstream consumerism where technology is an important dimension of the marketing process. Therefore, this article focused on assessing technology readiness in general among Ethiopian working professionals using the Technology Readiness Index. The data were collected from individuals working in government and private offices based in Addis Ababa, the capital of Ethiopia, during July-September 2014. The results of the study discussed the technology readiness of working professionals and also compared results from previous studies conducted in different geographies like U.S., China, and Europe using the Technology Readiness Index scale.**

***Keywords :*** **technology, readiness, Ethiopia, working-professionals**

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The most important trends in the business world, as observed by Tsikriktsis (2004), are shifting of economies from goods to services; rapid expansion of the information economy and electronic networks; and convergence of these two trends into the concept of e-service . With inclusion of the technology dimension to the popular three component pyramid model (i.e. company, employee, and customer), people-technology interaction becomes an important area of research interest and practice. Researchers have argued that in the people-technology interaction, both positive and negative feelings coexist with variance in their 'relative dominance' across individuals (Dabholkar, 1994 ; Parasuraman, 2000). Among various studies, technology readiness (TR) offers an impetus for researchers and practitioners to gain customers' readiness to embrace and interact with technology in a more comprehensive manner. Parasuraman (2000) defined technology readiness as, "people's propensity to embrace and use new technologies for accomplishing goals in home life and at work" (p. 308). In other words, technology readiness is a person's predisposition to use new technologies. This predisposition results from a gestalt of 'mental enablers' and 'inhibitors'.

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According to Mayer (2001), as the world economy focuses on developing markets, the developing economies have surpassed developed economies as recipients of FDI. These investments can be seen primarily in agriculture, infrastructure, and communication sectors. Moreover, as a policy measure, governments in developing markets are focusing on improving their information and communication technology infrastructure and application for sustained economic growth and social development. At this juncture, a study on assessing technology readiness among people of a developing market would reveal valuable insights. Therefore, this article focuses on assessing technology readiness in general among Ethiopian working professionals. It also compares results from previous studies conducted in different geographies like U.S., China, and Europe using the Technology Readiness Index (TRI) scale.

## Information Technology Landscape in Ethiopia : A Developing Country Perspective

Ethiopia, officially known as the Federal Democratic Republic of Ethiopia, is a country situated in the Horn of Africa. It is the second most populous nation in Africa. As per a survey conducted in 2014, there was a considerable increase in Internet users - from 10,000 users in 2010 to 1,826,035 users in 2014 in Ethiopia. Mobile subscription rate increased to 23.7 in Ethiopia (per 100 inhabitants) in 2012 from 8.3 in 2010 (Internet World Stats, 2014 ; United Nations, 2012).

Between 2009 and 2013, Africa showed the fastest growth in terms of internet penetration in households at 27%. However, there are many challenges for E-commerce in developing countries like lack of telecommunications infrastructure, lack of qualified staff to develop and support e-commerce sites, lack of skills among consumers needed to use the Internet, lack of timely and reliable systems for the delivery of physical goods, low bank account and credit card penetration, low income, and low computer and Internet penetration (Hawk, 2004). A study found that security and trust, Internet experience, enjoyment, language, legal issues, and technology acceptance are the major limitations for E-commerce growth in developing countries (Abbad, Abbad, & Saleh, 2011). The studies conducted in developing countries opined that these challenges and limitations play an important role in assessing the technology readiness (TR) in developing countries.

Nevertheless, sub-Saharan Africa slowly continues to develop its ICT infrastructure, especially by expanding the share of the population covered by, and having access to, mobile telephony and by expanding the number of Internet users (Bilbao-Osorio, Dutta, & Lanvin, 2014). A report published by The World Bank (2002) highlighted that the countries with pervasive information infrastructure that use innovative information technology applications possess advantages for sustained economic growth and social development. By securing consistently improved ranking among many indicators of the Global Information Technology Report, it is clear that Ethiopia emphasizes on the growth of the information and communication technology sector (Bilbao-Osorio et al., 2014).

A Cyber Security Africa report on the Ethiopia Banking & ICT Summit 2013 stated that Ethiopia's "committed" investment in ICT accounted for 10% of the country's overall GDP, and the government has invested over USD 14 billion over the last decade. Despite many challenges like infrastructure connectivity, the government's conservative stance on 'digital freedom,' particularly with reference to social networking and the Internet, Ethiopia attracted momentous interest from global telecommunication companies. For instance, in December 2013, China's Huawei Technologies invested $1.6 billion from Ethiopia's state run Ethio-Telecom to improve connectivity.

## Literature Review

Adoption and diffusion of innovation, theory of reasoned action (TRA), theory of planned behavior (TPB),

technology acceptance model (TAM), and technology readiness (TR) are the most important research streams which focus on addressing why certain customers adopt new technology; whereas, others do not (Tsikriktsis, 2004). In diffusion of the innovation stream of research, individual characteristics, information sources, and innovation characteristics were identified as the determinants of information technology adoption and usage (Ajzen, 1991 ; Brancheau & Wetherbe, 1990 ; Moore & Benbasat, 1990 ; Nilakanta & Scamell, 1990). Attitudes, social influences, and facilitating conditions were identified as predictors and intention of technology usage under theory of reasoned action (TRA) and theory of planned behavior (TPB) streams. Lin and Chang (2011) and Gombachika and Khangamna (2013) observed technology readiness (TR) as a consumer personality trait factor. Lin and Chang (2011) developed and tested an extended technology acceptance model (TAM) by integrating the direct and moderating role of technology readiness (TR) in context of self-service technologies (SSTs) such as kiosks, mobile services, ATMs, and so forth. The findings of their study supported a positive association of TR with perceived usefulness, perceived ease of use, attitude toward using SSTs and behavioral intentions, and also ascertained a positive impact on them. However, a moderating effect of TR was found, but not as was expected.

As observed by earlier researchers, TRI is a multi-item scale with psychometric properties, which can be used in gaining an in-depth understanding of the customers' readiness to embrace and interact with technology, specifically the Internet or/and computer-based technology. TRI can also be used in assessing the technology readiness of employees too (Parasuraman, 2000). There are many research studies that have confirmed TRI's scope of applicability. TRI was used across a variety of demographics and geographies. Say, for example, TRI was used as an assessment to investigate E-commerce adoption amongst Indonesian entrepreneurs (Astuti & Nasution, 2014). TRI was used to assess TRI of construction managers in Malaysia (Jaafar, Ramayah, Aziz, & Saad, 2007). TRI has been used in the healthcare industry to investigate the technology readiness among medical staff (Melas, Zampetakis, Dimpoulou, & Moustakis, 2014). In another interesting study, TRI was used to explain the digital divide in Jamaica. The study found out that there were no differences between TRI for developing and developed countries. Meng, Elliott, and Hall (2010) conducted a study with Chinese population and showed that the TRI is a cross - culturally valid instrument. These diverse studies highlighted the validity and robustness of the TRI.

Gombachika and Khangamna (2013) conducted a study in Malawi among technical, entrepreneurial, and vocational training (TEVT) students and used regression analysis to assess how the TR dimensions affected technology acceptance (TA). It was found that the attitude towards ICT was significantly related to TR and its constructs. However, TR explained only 33% of the variation, which needed further investigation for exploring the remaining 67% of the variations in attitude towards ICT . In order to address the predictability power of TRI, researchers in another study modified the original 36-item scale to a 14-item scale (Meng et al., 2010).

In the present times, due to a highly competitive business environment, it is inevitable for organizations to upgrade their existing systems, products, and technologies (Dixit, 2011). Small and medium enterprises (SMEs) contribute to the emerging economies in terms of job creation and others. However, SMEs face barriers in adopting ICTs because of lack of infrastructure, low awareness of willingness of managers, and so forth (Ongori, 2008).

Hence, from various studies in technology readiness and its related areas, it can be concluded that the TRI scale is being employed in a variety of countries and cultures (Meng et al., 2010). The previous studies also confirmed TRI's validity across countries and cultures with little disagreement on taxonomy of four types of 'technology customers' explored through TRI (Meng et al., 2010 ; Tsikriktsis, 2004). Hence, TRI is used in this study to assess the technology readiness of working professionals in Ethiopia. Ethiopia is one of the fastest-growing economies of Africa, and insights into Ethiopian working professionals is important to the global marketplace. At the same time, with macroeconomic changes, Ethiopian consumers would also move from traditional to mainstream consumerism where technology is an important dimension of the marketing process. So, the results of this study would provide important implications for practitioners. Though, we have come across studies which used TRI in

**Table 1. Respondents' Profile Statistics**

| Variable | % |
|---|---|
| **Gender** | |
| Male | 75.5 |
| Female | 24.5 |
| **Education** | |
| High school | 7.3 |
| Diploma | 18.2 |
| Bachelors | 61.8 |
| Masters | 12.7 |
| **Age** | |
| 20-30 years | 59.1 |
| 31-40 years | 30.9 |
| 41-50 years | 7.3 |
| 51-60 years | 2.7 |

**Table 2. Technology Readiness Dimensions**

**Descriptive Statistics (*N* = 110)**

| Construct | *M* | *SD* |
|---|---|---|
| Optimism | 3.99 | .53 |
| Innovativeness | 3.38 | .54 |
| Discomfort | 3.35 | .49 |
| Insecurity | 3.23 | .56 |

Note: 5 point scale: 1-*Strongly Disagree*, 5-*Strongly Agree*

the context of developing countries, there are hardly any studies which have discussed technology readiness of Ethiopian consumers (Abbad et al., 2011 ; Astuti & Nasution, 2014 ; Gombachika & Khangamna, 2013 ; Jaafar et al., 2007). Moreover, as suggested by Tsikriktsis (2004), in context of technology readiness studies, replication of studies would offer an opportunity to test the robustness of the taxonomy of technology customers.

## Methodology

**(1) Data Collection and Measurement :** The data were collected from individuals working in government and private offices based in Addis Ababa, capital city of Ethiopia during July-September 2014. Out of the 250 questionnaires distributed, 150 filled in questionnaires were returned, out of which 110 were usable. Initially, the questionnaire was shown to randomly selected five respondents to check whether they needed any assistance or required translation of the statements. The respondents confirmed that the statements used in the questionnaire were understandable, and all five respondents held almost the same interpretation for all the statements.

The Technology Readiness Index (TRI) developed by Parasuraman (2000) was used to assess technology readiness of each respondent. The Technology Readiness Index (TRI), a 36-item scale incorporates insights from earlier studies, mainly the eight technological paradoxes identified by Mick and Fournier in 1998 and consumer beliefs and motivations identified by Dabholkar in 1994 . The TRI contains 10 items of Optimism, seven items of Innovativeness, 10 items of Discomfort, and 9 items of Insecurity. The Table 1 shows the respondents' profile statistics.

**Table 3. Technology Readiness Dimensions per Group**

| | Cluster 1 (*N* = 37) | | Cluster 2 (*N* =25) | | Cluster 3 (*N* =15) | | Cluster 4 (*N* =33) | |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Optimism | 4.00 | .53 | 4 | .53 | 3.99 | .53 | 3.99 | .53 |
| Innovativeness | 3.38 | .54 | 3.37 | .54 | 3.37 | .54 | 3.37 | .54 |
| Discomfort | 3.35 | .49 | 3.35 | .49 | 3.35 | .50 | 3.35 | .49 |
| Insecurity | 3.24 | .56 | 3.23 | .56 | 3.22 | .57 | 3.22 | .56 |
| **TRI Overall** | **3.20** | **0.22** | **3.19** | **0.22** | **3.20** | **0.22** | **3.20** | **0.22** |

**Table 4. Correlations**

| | | Optimism | Innovation | Discomfort | Insecurity |
|---|---|---|---|---|---|
| **Optimism** | Pearson Correlation | 1 | .335** | .368** | .191* |
| | Sig. (2-tailed) | | .000 | .000 | .045 |
| | *N* | 110 | 110 | 110 | 110 |
| **Innovation** | Pearson Correlation | .335** | 1 | .401** | .324** |
| | Sig. (2-tailed) | .000 | | .000 | .001 |
| | *N* | 110 | 110 | 110 | 110 |
| **Discomfort** | Pearson Correlation | .368** | .401** | 1 | .321** |
| | Sig. (2-tailed) | .000 | .000 | | .001 |
| | *N* | 110 | 110 | 110 | 110 |
| **Insecurity** | Pearson Correlation | .191* | .324** | .321** | 1 |
| | Sig. (2-tailed) | .045 | .001 | .001 | |
| | *N* | 110 | 110 | 110 | 110 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

## Analysis and Results

**(1) Sample Characteristics :** The Shapiro-Wilk's test ($p$ >.05) shows that the TRI scores are approximately normally distributed for one or more variables of gender, age, and education. The Table 2 shows the technology readiness dimension and their scores. The TRI score for each individual respondent was computed as follows:

**TRI Score = {Optimism + Innovativeness + [6-Discomfort] + [6-Insecurity]}/4**

A two-stage cluster analysis was used to obtain distinct groups of respondents with the given sample. The Table 3 shows the technology readiness dimensions per cluster. It can be noted from the Table 3 that there is a very little variation in the mean scores of TRI across the clusters. It can also be noted that there is no change in standard deviation of TRI scores across the clusters. Hence, it is difficult to follow the taxonomy used to name each cluster in earlier studies, that is, Pioneers, Explorers, Skeptics, and Laggards. When TRI from the Table 3 is compared with TRI scores obtained in earlier studies, it can be stated that the respondents fall under the category of Skeptics (Parasuraman, 2000 ; Tsikriktsis, 2004).

A correlation analysis was conducted among the technology readiness dimensions, and the results are as depicted in the Table 4. It can be inferred from the Table 4 that there is a significant positive relationship between Optimism and Innovation & Optimism and Discomfort ; $r$ (108) =.335 and .368, respectively at $p$ =.000. There is

**Table 5. Cronbach's Alpha values**

| Optimism | Innovation | Insecurity | Discomfort | TRI |
|---|---|---|---|---|
| 0.69 | 0.68 | 0.71 | 0.75 | 0.72 |

**Table 6. KMO and Bartlett's Test**

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .643 |
|---|---|---|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1845.411 |
| | *Df* | 630 |
| | Sig. | .000 |

also a weak positive relationship between Optimism and Insecurity, $r$ (108) =.191 at $p$ = 0.045. Innovation is found to be positively related with Discomfort as well as Insecurity, $r$ (108) =.401 and .324 at $p$ =.000 and 0.001, respectively. Likewise, there is a significant positive relationship between Discomfort and Insecurity. It is also found that there is a weak positive relationship between Insecurity and Optimism.

These results confirm the results of earlier studies, which showed that even technology Optimists and Innovators also experienced technology-related anxieties (Parasuraman, 2000 ; Tsikriktsis, 2004). Internal consistency of the individual items of the scale was measured using Cronbach's coefficient alpha values. The Table 5 shows the Cronbach's coefficient alpha values of each construct and the overall TRI scores. The scores mentioned in the Table 5 are almost more than or equal to 0.7, which shows that the scale is reliable to use. The KMO value given in the Table 6 is 0.643, which confirms that the sample is adequate to use the scale.

## Managerial Implications

The findings of the study reveal important insights for managerial implications. It was observed that government spending contributed to upgrade the ITC infrastructure of the country. However, there is slow IT penetration among the consumers. Majority of the respondents fall under the classification of Skeptics or Pioneers. This poses a challenge for the companies to venture into doing business through the Internet or E-commerce. One way that managers could overcome this challenge is to educate consumers regarding E-commerce. Another way is that managers can positively influence the policy makers to devise policies which are conducive to promote technology in commerce. Managers with sound knowledge of the present customers' level of technology acceptance (i.e. Skeptics and Pioneers) may devise marketing strategies and tactics, which would aim at improving consumer trust towards usage of technology in general, and consumption, in particular.

## Conclusion

The empirical evidence from this study shows the reliability of the technology readiness index (TRI) as a scale to assess technology readiness among Ethiopian population. From the correlation analysis among the constructs, the study found out the existence of technological paradoxes, which is in conformity to the earlier studies conducted with the U.S. and U.K. population (Parasuraman, 2000 ; Tsikriktsis, 2004). Another important finding from this study is that there is no empirical evidence with the given population for the taxonomy used (i.e, Explorers, Pioneers, Skeptics, and Laggards) in the earlier studies. Majority of the respondents are classified as either Skeptics or Pioneers based on their overall TRI scores. A possible explanation for this could be a low-technology penetration in Ethiopia and/or cultural differences (U.S. and UK population).

## Limitations of the Study and Scope for Future Research

Limitations of the study are associated with sampling as the sample comprised of entirely working professionals in Ethiopia. In order to improve its generality, the sample shall comprise of various demographics such as students. Hence, one avenue of future exploration can be a more representative sample of Ethiopia to examine TRI. The study brought out the absence of taxonomy used in earlier studies. So, further studies can explore possible reasons for the difficulty in categorizing respondents based on the taxonomy used in earlier studies.

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