

# An Empirical Study of the Factors Affecting Customers' Acceptance Intention of E-Invoice Services: The Case of Mashhad Electricity Distribution Company

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## ABSTRACT

The way of delivering services to customers has been revolutionized as a result of the recent developments of information and communication technologies (ICT) all over the world. Despite of advantages of E-services, their acceptance in public has been low, and this has been emerged as a basic obstacle in development of e-government services. To settle this predicament, we should identify public's criteria for adoption and acceptance of this technology. The aim of this study is to investigate the affecting factors in acceptance intention of E-invoice based upon the second version of Acceptance and Use of Technology (UTAUT2) Model. The statistical community was 3-phase 50-amp (or more) power costumers of Mashhad Electricity Distribution Co. and the volume sample were 432 persons. Required data were collected by use of a questionnaire. For data analysis, we applied SPSS and AMOSS software and the statistical method of Structural Equations. Our findings revealed that variables of performance expectation, effort expectation, social influence, trust in E-government, data security, and perceived risk are effective on e-invoice acceptance intention. On the other hand, the influence of data security on acceptance intention via perceived risk and the influence of data security on acceptance intention via trust in E-government services have been proved. In this study, the effect of facilitating conditions on acceptance intention was not confirmed.

## Categories and Subject Descriptors

H.1.2. Information Systems, Information Systems User, Machine Systems, Human Factors

## General Terms

Measurement, Experimentation, Human factors

**Keywords:** E-government, E-invoice, Technology Acceptance, The second version of Unified Theory of Acceptance and Use of Technology (UTAUT2).

## 1. INTRODUCTION

Information and communication technologies (ICT) entered to the market as a new system in 1990s and grew quickly. One of the momentous opportunities and challenges that today organizations are facing is the use of web-based technologies. As a modern channel for economic trades, Internet has provided many new resources of creating revenues and opportunity for organizations, so as the volume of Internet trades increases day by day and those companies that do not exploit this technology will disappear from the market soon (Lian et al., 2014). Nowadays, both business sector and government mean to establish and design and deliver online or mobile services (Pokharel& Park, 2009). One of e-services is e-invoicing. Though the use of e-invoice has several advantages, such as reduced paper waste, reduced printing cost, saving in delivery cost, less intercity travels and consequently less fuel consumption, reducing air pollution, and improving financial performance of organizations, and in spite of this fact that e-invoicing is popularized worldwide, each year with higher speed than the previous year, some people prefer paper invoice to e-invoice due to concerns about security and risk taking. According to findings, only 8 percent of population use e-invoice (Liberty Times, 2014).

In general, e-services are the core of development and the major issue in this context is reduction of paper consumption, communally in applying, workflow, and invoicing stages. For implement and operating, there is a must for customers to practice, learn, study and participate in e-requests and to accept and use this technology. This compels us to identify and scrutiny factors influencing the intention of e-services acceptance and

receiving and paying e-invoices by customers (Lian, 2015). Acceptance of information technology by users is the principal factor in e-government and e-invoice success. Thus, governmental support is not the only success key, and users' desire to accept e-government services is very influential (Carter & Belanger, 2005), and this technology cannot be beneficial if not used. So the study of information technology acceptance in society attracts the attention of many researchers. The Unified Theory of Acceptance and Use of Technology (UTAUT2) (Venkatesh et al., 2012) shows that when studying users' reasons for accepting and using information technology, there is a specific attribute for each studied condition and background. According to the second version of Acceptance and Use of Technology model, in order to investigate the success of offering e-services and then e-invoicing, some issues including security concerns, as well as perceived trust and risk must be considered (Lian, 2015).

## 2. Literature Review

Implementation of information technology (IT) and e-invoicing comprises various steps and one must have adequate attention to the factors affecting this process, like culture, infrastructures, information hardware and data communication. Maybe it could be assumed that physical infrastructures of e-services exploitation are easily accessible, but software infrastructures such as intention of such technologies acceptance by people and customers of organizations should be especially noticed (Venkatesh et al., 2012). Since acceptance or refusal of IT among users has a vital effect on its success, researchers of information technology and information system have been long interested in studying theories and models capable to anticipate and analyze behaviors (Venkatesh et al., 2003). The theory of Planned Behavior (Ajzen, 1991), the second model of Technology Acceptance (Venkatesh & Davis, 2000), and the Innovation Diffusion Theory (Rogers, 1983) are the most important theories and models in this field. However, the Unified Theory of Acceptance and Use of Technology provides a more useful insight towards perceiving intention of people using e-government services. The Unified Theory of Acceptance and Use of Technology determines people's behavioral intention for using technology by means of factors of performance expectation, effort expectation, social influence and facilitating conditions (Venkatesh et al., 2003). Beside all variables of Unified Theory of Acceptance and Use of Technology, the second version of it (UTAUT2) has regarded three variables of trust, security and perceived risk and surveyed interactions between them (Venkatesh et al., 2012). Many preceding studies have been based on these theories and models. Table 1 shows some of national and international researches carried out about acceptance and use of information and communication technology.

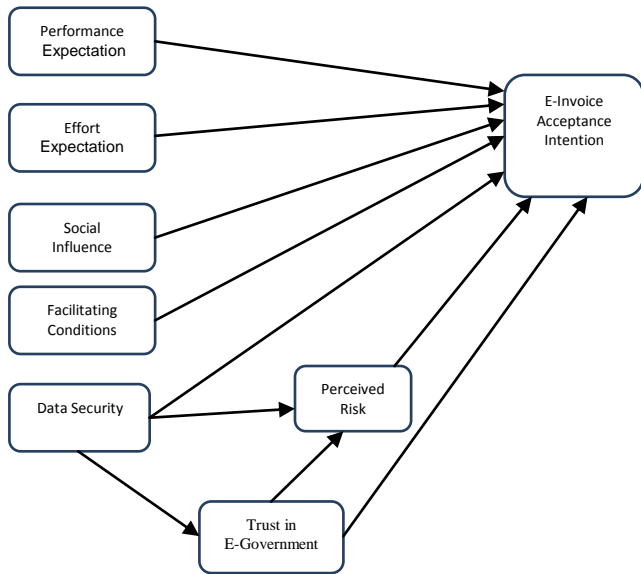
**Table 1. Some studies results regarding E-Services acceptance models**

Research ers	Used model	General results
Kamali & Barkuiy, 2012	Unified Theory of Acceptance and Use of Technology	Extents of trust in system, socioeconomic influence, self-efficacy, personal aspects and website measures have the greatest positive effect on customers trust, and perceived risk has a negative effect on trust.
Lagzian et al., 2011	Unified Theory of Acceptance and Use of Technology	Correlation between performance expectation, effort expectation, facilitating conditions and influence of peers on acceptance intention was proved.
Lagzian & Pour-Bagheri, 2014	Unified Theory of Acceptance and Use of Technology	Organizational and social factors affect performance expectation and perceived ease. Also the effect of perceived ease and usefulness on attitude towards use and eventually the effect of this variable on behavioral intention has been confirmed.
Lian, 2015	Second version of Unified Theory of Acceptance and Use of Technology (UTAUT2)	Social influence, effort expectation, trust in e-government, and perceived risk are correlated with e-invoice acceptance. On the other hand, the relation between perceived risk, data security and behavioral intention has been shown. Relations of performance expectation, Facilitating Conditions, and data security with acceptance intention, and the influence of e-trust on perceived risk were not proved.
Vetiniuty, 2013	Unified Theory of Acceptance and Use of Technology	Performance expectation, effort expectation and performance accuracy of service counters, trust in government, trust in Internet, and finally the social influence are key factors that affect acceptance of e-government services.
Alomari, 2014	Unified Theory of Acceptance and Use of Technology	Trust in Internet, designing websites, religious beliefs, self-confidence while using computer and Internet, (verbal) publicization of e-government, resistance to change, performance expectation, relative preference, intricacy and usefulness were effective on e-government services acceptance by citizens.

### 3. The conceptual Model of research

The Unified Theory of Acceptance and Use of Technology (UTAUT) is rather new, but its propriety, validity and reliability in different areas of technology acceptance researches have been proved (Weerakkody et al., 2013).

In present work, the second version of Unified Theory of Acceptance and Use of Technology was used for analyzing variables. The study subject was investigating factors that influence e-invoice acceptance intention.



**Figure 1. The conceptual Model of study (adapted from Lian, 2015)**

Since e-invoicing is a brand new issue and people are not acquainted with this kind of invoice and its paying, there is a need for an all-inclusive assessment of factors influencing acceptance intention. Previous studies have disclosed that data security is the most important factor that affects acceptance intention (Subashini & Kavitha, 2011; Zissis & Lekkas, 2011; Lian, 2015). Moreover, several researchers have demonstrated the effect of trust in government and perceived risk on e-invoice acceptance intention (Fang et al., 2005, 2006; Pavlou & Gefen, 2004). Therefore, according to second version of Unified Theory of Acceptance and Use of Technology, three variables of data security, perceived risk and trust in e-government (e-trust) are added to the previous model to analyze their relations. Figure 1 illustrates the conceptual model of present study.

### 4. Research Hypotheses

Considering the conceptual model of the study, our hypotheses are as follow:

H1: Performance expectation has significant effect on e-invoice acceptance intention.

H2: An Effort expectation variable has significant effect on e-invoice acceptance intention.

H3: Social influence has significant effect on e-invoice acceptance intention.

H4: Facilitating conditions has significant effect on e-invoice acceptance intention.

H5: Trust in e-government services has significant effect on e-invoice acceptance intention.

H6: Data security has significant effect on e-invoice acceptance intention.

H7: Perceived risk has significant effect on e-invoice acceptance intention.

H8: Data security has significant effect on trust in e-government services.

H9: Data security has significant effect on perceived risk.

H10: Trust in e-government services has significant effect on perceived risk.

H11: Data security has significant effect on e-invoice acceptance intention mediated by perceived risk.

H12: Data security has significant effect on e-invoice acceptance intention mediated by trust in e-government services.

### 5. Research methodology

Since aiming to investigate and analyze factors affecting customers' acceptance intention for e-invoice (in the case study of Mashhad Electricity Distribution Co.), this study is practical in the view of goal, and since we attempt to examine the extent and kind of relations between variables by means of a questionnaire to solve a scientific issue in the real world, in the view of methodology this research is an analytical survey.

The statistical community included customers of Mashhad Electricity Distribution Co. with requested demand of 3-phase 50 amp (or more), and because of using structural equations model for inspecting relations between variables, the number of required samples was between 10 and 15 items for each observed variable (question of questionnaire) (Chen, 1998), while considering the size of statistical population and number of variables, 12 items per variable is an acceptable criterion to determine the sample volume of this work. Totally 432 customers were chosen as responders (sample volume). The sampling method was layered, and in each layer a random sampling was carried out. As we predicted that some of questionnaire would not be returned, a whole number of 580 questionnaires was distributed, from which 439 questionnaires were filled and returned, and the rest were unused due to not returning or not filling. The used questionnaire in this study was a standard one used in previous works, consisting of 2 parts, 4 items about demographical descriptive data and 36 items about inferential data. In order to assess these items, the 5-point Likert scale (from "completely agree" level to "completely disagree" level) was employed. For analyzing the content of superficial validity, the questions of questionnaire were evaluated by experts of management, senior managers of Electricity Distribution Co. and some of customers in an interview to assess fluency of questions and their ability to measure related constructs and subsequently amend them as required. Confirmatory factor analysis by means of AMOS software was

used in order to examine construct validity. The results of steps 1 and 2 of confirmatory factor analysis showed that with the exception of two, namely SC8 and 6SC items from data security variable, regression weights of variables for predicting all dimensions and items were not significantly deviate from zero (at a confidence level of 0.95); so two abovementioned items were withdrawn from analysis process. The reliability test was done by SPSS software and the reliability values for all variables and dimensions were above 0.7. AMOS software together with structural equation modeling was used for data analysis.

## 6. Research Results

### Results concerning demographical specifications:

Results of primary surveys about demographical specifications revealed that 89.1 percent of answerers were male and 10.9 percent were female. Regarding age group, 0.7 percent of answerers were younger than 20, 22.8 percent were between 21 and 30, 55.4 percent were between 31 and 50, 15.7 percent were between 50 and 60, and 5.5 percent were older than 60 years of age. As for education, 30.3 percent had diploma or lower degree, 49 percent had Associate or Bachelor degree, 18.0 percent had Master degree, and 2.7 percent had Doctorate. Among answerers, 22.1 percent had less than 5, 25.5 had between 5 to 10, and 52.4 percent had more than 10 years of customership background.

## 7. Results concerning research hypotheses

Table 2 demonstrates the results obtained from analysis of intra-model relations and regression coefficients between latent variables.

The partial index (p-value) and significance number (Sig.) were used to test hypotheses. The stipulation of significance is that, in the considered relation, the amount of first index (p-value) is less than 0.05 or the amount of second index (t-value) is more than  $\pm 1.96$ .

As shown in Table 2, the results of data analysis demonstrated that variables of performance expectation (path coefficient of 0.15,  $p = 0.000$ , and  $t = 3.428$ ), effort expectation (path coefficient of 0.28,  $p = 0.000$ , and  $t = 6.616$ ), social influence (path coefficient of 0.34,  $p = 0.000$ , and  $t = 8.064$ ), trust in e-government (path coefficient of 0.26,  $p = 0.000$ , and  $t = 3.987$ ), and data security (path coefficient of 0.14,  $p = 0.032$ , and  $t = 2.142$ ) had significant positive effects on acceptance intention. The variable of perceived risk (path coefficient of -0.44,  $p = 0.000$ , and  $t = -7.750$ ) had a significant negative effect on acceptance intention. Also, variables of data security (path coefficient of -0.39,  $p = 0.000$ , and  $t = -6.128$ ) and trust in e-government (path coefficient of -0.29,  $p = 0.000$ , and  $t = -4.509$ ) had significant negative effects on perceived risk. The significant positive correlation with variable of data security (path coefficient of 0.64,  $p = 0.000$ , and  $t = 10.949$ ) was proved. Based on these results, the effect of facilitating conditions (path coefficient of 0.002,  $p = 0.602$ , and  $t = 0.522$ ) was not affirmed.

**Table 2- Regression coefficients and significance of effects of independent variables on dependent ones.**

Hypothesis	Direct path	Path coefficient	p-value	Sig.	Result
1	Performance expectation → Acceptance intention	0/15	0/000	3/0428	Accepted
2	Effort expectation → Acceptance intention	0/28	0/000	6/616	Accepted
3	Social influence → Acceptance intention	0/34	0/000	8/064	Accepted
4	Facilitating conditions → Acceptance intention	0/002	0/602	0/522	Refused
5	Trust in e-government → Acceptance intention	0/26	0/000	3/987	Accepted
6	Data security → Acceptance intention	0/14	0/032	2/142	Accepted
7	Perceived risk → Acceptance intention	-0/44	0/000	-7/750	Accepted
8	Data security → Trust in e-government services	0/64	0/000	10/949	Accepted
9	Data security → Perceived risk	-0/39	0/000	-6/128	Accepted
10	Trust in e-government → Perceived risk	-0/29	0/000	4/509	Accepted

Source: research findings

**Table 3. Results obtained from mediation analysis of perceived risk in relation with data security and acceptance intention.**

Step	Independent variable	Dependent variable	$\beta$	R	R <sup>2</sup>	Sig.
1	Data security	Acceptance intention	0/389	/3890	/1510	/0000
2	Data security	Perceived risk	0/579	/5790	/3350	/0000
3	Perceived risk	Acceptance intention	0/441	/4410	/1950	/0000
4	Data security Perceived risk	Acceptance intention	0/201 0/325	/4700	/2210	/0000 /0000

Source: research findings

## 8. Investigating mediation hypotheses

Results from analyzing data of mediator variables displayed the significant effect of these variables in the model. Tables 3 and 4 show the results of data analysis for mediator variables.

Therefore, in the light of above results, we can state that all hypotheses of this study, except the fourth one, were affirmed.

## 9. Discussion and conclusion

The goal of present research was to investigate factors influencing e-invoice acceptance intention by customers of Mashhad Electricity Distribution Co. We analyzed the effects of performance expectation, effort expectation, social influence, facilitating conditions, trust in e-government, data security, and perceived risk on customers' acceptance intention.

Results of data analysis showed that performance expectation has a significant and positive effect on common acceptance intention, so the first hypothesis is proved. These findings are consistent with those from previous studies (Venkatesh et al., 2003, 2012; Lean et al., 2009; Park & Ryoo, 2013; Weerakkody et al., 2013). Acceptance of this hypothesis means that efforts for improving the quality of offered services can encourage customers for e-invoice acceptance intention.

The results of analyzing data related to the second hypothesis showed that effort expectation is effective in e-invoice acceptance intention of high-demand customers of Mashhad Electricity Distribution Co., and thus, the second hypothesis is also approved. These findings are in accordance with those obtained by Venkatesh et al. (2003, 2013), Alryalat et al. (2012), Hung et al. (2006), Park & Ryoo (2013) and Lian (2015).

Results of analyzing the third hypothesis confirm the effect of social influence on common acceptance intention. This is consistent with findings of previous studies, including works of Escobar-Rodriguez & Carvajal-Trujillo (2014), Zhou et al. (2010) and AlAwadhi & Morris (2008). Confirming this hypothesis means that people might have insufficient acquaintance with e-services, and to increase the acceptance intention of customers, Mashhad Electricity Distribution Co. should step forward to develop and extend use of this technology by means of social influence, so that the customers who have accepted this technology are deployed to develop and introduce e-services and e-invoice more widely to the community.

Assessing the fourth hypothesis indicated that facilitating conditions have no significant influence on e-invoice acceptance intention, thus the fourth hypothesis is refused. It should be mentioned that Lian (2015) has refused this hypothesis too. This refusal means that facilitating conditions are not effective in e-invoice acceptance intention, because mobile telephones are accessible for all the society, which deliver many of e-services to the citizens and easily connect to the Internet network, and of course, many people are familiar with them and their abilities.

Our results represented that trust in e-government services has a positive and significant effect on e-invoice acceptance intention and the fifth hypothesis is accepted. This result conforms to the results of prior studies (Subashini & Kavitha, 2011; Zissis & Lekkas, 2011; Fang et al., 2005, 2006; Lian, 2015). This means that Mashhad Electricity Distribution Co. should deliver its e-services in a manner that when using these e-services, the customers perceive that comparing to the risk taken, their gain is more efficacious rather than impersonal attendance. This means that trust is essential to evaluate the relation strength and level of e-invoice acceptance by customers. As Li & Hu (2008) stated, for promoting longtime relations, an apt trust can improve the common reliability. In other words, more trust leads to better interactions between service providers and customers, and sets long lasting exchanges which can benefit both sides.

Results of data analysis proved that data security has positive and significant effect on e-invoice acceptance intention. Thus the sixth hypothesis is accepted too. Zissis & Lekkas (2011), Paquette et al. (2010), and Subashini & Kavitha (2011) showed the existence of such significant correlation between variables of data security and acceptance intention, which is in line with our findings. It should be mentioned that in Lian reports (2015) this hypothesis was refused. Data security makes customers more

assured and this confidence provide the essential motivation to resume cooperation of customers with the system.

In examining effects of perceived risk on e-invoice acceptance intention, it was clarified that perceived risk has a negative significant effect on e-invoice acceptance intention of customers of Mashhad Electricity Distribution Co., and the seventh hypothesis is accepted. This is in accordance with findings of Akman et al. (2005), Dwivedi et al. (2006), Garbarino & Strahilevitz (2004), Lian & Yen (2014), Riedel et al. (2010), Taipale (2013), Van et al. (2002), Woo (2003), and Martins et al. (2014). This signifies that in the Internet world people feel low control on their privacy, and this fact that how private information are collected and how they are circulated and transmitted through Internet exchanges, may results in raising customers' mistrust and acts as a basic barrier against promoting e-payments. Thus, the more risk customers perceive, the lower is the probability that they accept e-invoicing, and the lower risk they perceive, the higher preference they have for e-invoicing, and in this relation, Mashhad Electricity Distribution Co. should performed the required planning.

Examining the eighth hypothesis of this study proves that data security has significant positive effect on trust in e-government services (in brief, e-trust). This finding is supported with results of previous studies (Carter & Belanger, 2005; Lean et al., 2009; Kim et al., 2010; Lian, 2015). Acceptance of this hypothesis signifies that dealing with customers' worries about data security is the uppermost factor to create trust in e-government. So it is necessary to inspect security issues throughout the process, identify susceptible points and make them impervious. In other word, the more is the security, the more is the trust in e-government.

By studying effect of data security on perceived risk, it can be understand that data security affect perceived risk and the ninth hypothesis is acceptable. This result fits with results obtained by researchers like Chellappa & Pavlou (2002), Kim et al. (2010) and Lian (2015). Acceptance of this hypothesis signifies that the more is data security; the lower will be customers' perceived risk. If customers understand that Electricity Distribution Co. has required sensitivity to care for customers' privacy, and from dispatch to archive, their personal private information are not accessible to others, they perceive lower risk and accordingly they feel more tranquility.

Findings from data analysis reveal that effect of trust in e-government services on perceived risk is negative and significant, so the tenth hypothesis is also accepted. In other word, the more is the trust, the less is the perceived risk. Morgan & Hunt (1994), Hoffmann et al. (1999) and confirmed the existence of significant relation between variables of trust in e-government services and perceived risk which is in agreement with our findings.

Studying effects of data security on e-invoice acceptance intention mediated by perceived risk displayed that data security significantly affects e-invoice acceptance intention mediated by perceived risk in customers of Mashhad Electricity Distribution Co., and therefore, the eleventh hypothesis can be accepted. Results from analyzing this hypothesis are consistent with those of Sekumbeet al. (2009) and Lian (2015).

Finally, study on effects of data security on e-invoice acceptance intention mediated by trust in e-government services indicated that data security significantly affects e-invoice acceptance

intention mediated by trust in e-government services, and therefore, the twelfth hypothesis can be accepted. Results from analyzing this hypothesis are consistent with those of Lian (2015).

Based on the results and assessments of this research, we can propose some recommendations to make practical use of these findings.

Considering significant effect of performance expectation on e-invoice acceptance intention, it is needed that Electricity Distribution Co. supply the profits and revenues gain from electronic payment of invoices [such as time saving, less expenses, reduced bureaucratic processes, increased responsibility of government, i.e. Electricity Distribution Co., against users (Carter&Belanger, 2005) and increased efficiency and effectiveness of organization offered e-services for customers.

Considering significant effect of effort expectation on e-invoice acceptance intention, it is needed that Electricity Distribution Co. inform people of the convenience and ease of using e-invoice. The effect of website and service delivery framework in the first visit of this website on its visitor or customer is very important. The appearance of website should be simple, clear and beautiful. Visiting sites and web browsing must be easy. The simple design of Electricity Distribution Co. website can assure users that they don't have any difficulty in use of e-services like e-invoice. It is recommended that the website includes a "Help" menu (step-by-step pictorial instruction), is loaded quickly, and there is no need to download any tool like Java or Flash to visit it.

In the section of social influence, Electricity Distribution Co. must utilize extensive advertising (e.g. holding seminars and workshops, providing posters and bulletins for citizens in public places, using short message service, and public media) to introduce e-services like e-invoice. This informing must be in a manner that various strata with any educational background and any level of web using experience are encouraged to use these kind of services.

Considering significant relation between trust in e-government and e-invoice acceptance intention, it is proposed to develop a concentrated division with essential authorities to synchronize and progress affairs related to e-invoicing and control the processes.

While much of answerers had the intention of accepting e-invoice, but their worries about the sixth hypothesis (effect of data security on e-invoice acceptance intention), the seventh hypothesis (effects of perceived risk on e-invoice acceptance intention), the eighth hypothesis (effect of data security on trust in e-government services) and the tenth hypothesis (effect of trust in e-government services on perceived risk) is evident as well. In other word, factors that reduce e-invoice acceptance intention are mistrust in e-government, mistrust in data security and the perceived risk. So it is vital to enhance security with following recommendations:

Presenting communicational specifications of service provider to the customers is of critical importance. Many visitors of website and those who tend to use e-invoice services need occasional aids, so specifications such as postal address, e-mail address, and telephone number must be available in website.

Due to concerns about misuse of one's personal information by villains, many people seek policies about observing privacy in

websites. Thus, Electricity Distribution Co. must assure its customers that their information will not share or put on sale with any third party.

Security index of website for protecting collected data, developing data encryption, and obtaining SSL Certificate are some effective ways to draw visitors trust, which are based on encrypting input data and putting them on the Internet. Presence of SSL Certificate on a website shows that sending data to that website is completely safe and secure.

When customer signs in, e-invoice system must request a user code (password).

E-Invoice system must enable customers to edit and modify their payment information before completion of payment final step.

E-Invoice system must be designed so that exhibits a brief of payment information before final confirmation by customer, and send the customer payment verification after completion of paying process.

Customers' concerns about security issues must be found easily in the menu of "Common questions" or "Help",

## 10. Suggestions for future Research

Since present investigation has been performed among customers of Mashhad Electricity Distribution Co. with demand of 3-phase/50 amp (or more), it is suggested that this investigation is repeated between customers of lower amperage.

This study has inspected e-invoice acceptance intention from customers' point of view. However, successful implementation of a new technology demands assistance of organization human resources. Hence, future studies can inspect opinions of Electricity Distribution Co. managers or employees about offering all services in electronic format.

Considering research background and tested variables in previous works, studying relations between these variables and other ones is recommended

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