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Evaluation of Personal Disposition Level of Technology Adoption

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ABSTRACT

In the current paper, firstly literature is reviewed and various Evaluation of personal disposition level of technology adoption models in different industries are studied and finally, an assessment model selected that it was divided into 7 main classes with 46 indexes. So questionnaires were distributed among 30 experts in Iran Khodro Co. working in technical departments. Then, scores were given to 46 indexes by experts and final score of 46 indexes and 7 main components were evaluated. Considering obtained scores it was specified that the experts of this company has highest capability in habits capability (84.83%) and social influence capability (79%), compared to other components. Also, it has lowest capability in risk taking capability (55.73%) and Psychological resilience capability (64.58%). In addition, innovativeness (78.72%), optimism (76.39%), self efficacy (72.78%), are in average level compared to other components. Finally, some recommendations are made regarding components and indexes with lower score in the organization.

1. Introduction

Studies on technology adoption have aimed to understand, predict and explain variables influencing adoption behaviour individually as well as organizational levels to accept and use technological innovations [1]. Although introduction of the latest technologies have aimed at enhancing convenience of the customers, yet researchers have found that not all the customers adopt technology in the same pattern owing to the differences in their personal disposition towards technology adoption [2,3].Today's business organizations have become increasingly dependant on information technology to carry out their daily operations. As a result, small and big companies have spent heavily in computer systems, software, and services. However, without full cooperation from the end users, these investments do not necessarily translate into productivity gains and competitive advantage. When individual users accept and integrate technologies into their daily work, actual usage could link information technologies to their realized benefits [4]. Iran has a long history in automotive production. The lifting of sanctions would create opportunities to explore joint venture partnerships with a range of Western auto manufacturers who could bring the latest technology and manufacturing techniques, and the managerial know-how to produce vehicles that will be able to compete in world markets. Domestically, there are opportunities for enhanced employment, especially for young people, along with its associated up skilling and prospects for personal training and development [5]. So, the purpose of this paper is to evaluate the personal disposition level of new technologies adoption to identify weaknesses and strengths in various aspects related to dealing with the adoption of new technologies by experts of Iran Khodro Company.

2. Literature

In this part a number of previous studies on technology adoption in organizations and the factors which have effect on them will be studied. Finally, due to the similarity of the case study organization with the organizations which are studied and also the frequency of those indicators Model with its index is extracted and analyzed.

Irbha Magotra and et al, from Fairfield Institute Management and Technology, New Delhi, India, has attempted to explore personal disposition of individuals towards technology adoption through the development of an index named as Technology Adoption Index. For developing the index, exploratory factor analysis approach has been employed on the sample of 1201 responses collected from the residents of 12 different cities in India. Accordingly, the results of the index have indicated significant role of seven personal traits, namely, optimism, innovativeness, self-efficacy, risk taking propensity, habit, social influence and psychological resilience while manifesting personal disposition of individuals towards technology adoption, the technology adoption propensity of the individuals. Accordingly, the results have unveiled that the personal disposition of the individuals towards technology adoption increases with enhancement in their income and qualification but decreases with enhancement in their age[6].Oded Nov from Polytechnic University, New York, and Chen Ye, from University of Illinoi at Chicago investigates two personality traits established in the psychology literature, RTC[1] and Openness, as determinants of PIIT[2]. A survey of 121 prospective users of a digital library system was conducted to

[1] Resistance to Change

[2] Personal Innovativeness in IT

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test their hypotheses. The findings suggest that RTC[3] and Openness are determinants of PIIT [7]. Daniel Belanche and et al, from Faculty of Economics, Zaragoza University, analyses the adoption of e-government services and proposes that trust and personal values contribute to better understand such adoption. Data were collected through a web survey targeted to the Spanish-speaking potential users of e-government services. Results reveal the mediating role of trust into the TAM framework which is confirmed by a rival models analysis. Besides, citizens' personal values moderate the influence of some antecedents of the intention to use e-government services, which suggests some interesting implications for public administration strategic marketing [8]. Babak Kianian and et al analyze the adoption of AM technologies in Sweden. The dataset consists of a recent and representative sample of Swedish AM users (companies, universities, and research institutes). The main findings of this paper are as follows. (i) There is a variation among users' choice of AM application and the majority of users are expanding their AM applications beyond rapid prototyping. (ii) There are two factors that positively affect the decision of firms to expand classical rapid prototyping and incorporate production and management as well [9]. (Asoke Dey and et al) from College of Business Administration, The University of Akron, Ohio, USA have been done an article with the topic of USARFID in US hospitals: an exploratory investigation of technology adoption. The study found that a high percentage of respondents have adopted or are considering adopting RFID technology as a new management tool. Organizational and technological factors have strong positive influence on adoption, whereas environmental factors do not significantly affect the adoption decisions[10]. John Rogers from Roamef, UK and et al have explored the overview and adoption of BIM from the perspective of Malaysian ECS firms, with its objectives first, to determine the perceptions, barriers, governmental support and intentions in adopting BIM , and second, to identify the key drivers for adopting BIM within two years. The primary data were collected from focus group interview and questionnaire survey to achieve the first objective, and subsequently, the second objective was achieved based on Pearson relationship analysis. The results show that the firms have a concept of BIM that equates to industry authorities' norms; yet the lack of well-trained personnel, guidance and governmental supports were identified as the main barriers to adoption. Nevertheless, the firms were prepared to adopt BIM where market demands and competitive advantage were the main drivers to adoption within two years [11]. Sang-Gun Lee and et al in their article "Innovation and imitation effects' dynamics in technology adoption" tried to investigate longitudinal patterns of ICT and non-ICT products' adoption over life cycles. They used Bass diffusion model to discern distinctive changes in users' adoption behaviour due to the innovation and the imitation effects. They showed that the innovation effect is more influential for innovators and opinion leaders than it is for all adopters. However, it diminishes as time passes. Conversely, the imitation effect becomes a more powerful factor for the early majority, late majority and laggards.The imitation effect in the ICT industry is greater than that in the non-ICT industry, revealing the high network effect in ICT diffusion. Mobile phones are not the representative of all ICTs as the automobiles also do not represent all utility products [12]. Bradford L Barham and et al in the paper" Risk, learning, and technology adoption" explore how decision makers learn and use information, with an application to the adoption of biotechnology in agriculture. They find evidence that very few individuals are Bayesian learners, and that the population of farmers is quite heterogeneous in terms of learning rules. In addition, they do not find a strong relationship between observed learning styles and the timing of GM seed adoption [13]. Nguyen and et al in their paper "Information Technology Adoption in Small Business: Confirmation of a Proposed Framework" investigate which drivers affect IT adoption and which factors relate to a successful IT implementation in small businesses, where the adoption rate is traditionally low and the failure rate is high. The findings from this study suggest that customers are the main driving force of IT adoption. When it comes to IT implementation, our results suggest that managers/owner–managers must engage with five factors: organization, internal IT resources, external IT consultants, supplier relations, and customer relations [14]. Michele Battisti from Department of Law, University of Palermo, and et al in their research "Unbundling Technology Adoption and TFP at the Firm Level: Do Intangibles Matter?" used a panel of European firms to investigate the relationship between intangible assets and productivity. They distinguished between TFP and technology adoption, whereas standard estimations consider only a notion of productivity that conflates the two effects. They found that intangible assets have non negligible effects that both push firms toward better technologies (technology adoption effects) and allow for more efficient exploitation of a given technology[15]. Among the many theoretical models, TAM is widely accepted model for understanding IT adoption and usage processes. It explains much of the variance in users' BI related to IT adoption and usage across a wide variety of contexts [16]. It predicts a user's acceptance of IT and its usage on the job [17]. TAM and TOE are widely used in studying technology adoption at organizational level. Most of the studies have found TAM as the valid, robust and most dominant model to explain the technology adoption at organizational levels [18].

According to literature review, a conceptual model was chosen for this study are presented in the next section. The reason for choosing this model to assess the technology adoption of specialists in Iran Khodro in this study was that its indicators are so similar to structure of automobile industry.

In addition, since the previous models in automobile industry, especially in Iran evaluating of the technology adoption have not done, so do the current research is innovation.

3. Main Focus Of The Chapter

a. Theoretical Foundations

Based on the literature review and the research question, evaluation will be done based on given model by Irbha Magotra and et al (2016).

The model is as follows:

Therefore, based on the model shown in Figure 1, Iran Khodro experts regarding the acceptance of new technologies will be evaluated to identify strengths and weaknesses in the relevant indicators and finally to overcome the weaknesses of experts, proposals to strengthen these weaknesses and better acceptance of new technologies in their business activities in order to increase the quality of their work, will be provided.

[3] Resistance to Change

The process of evaluation and research methodology is explained in the section.

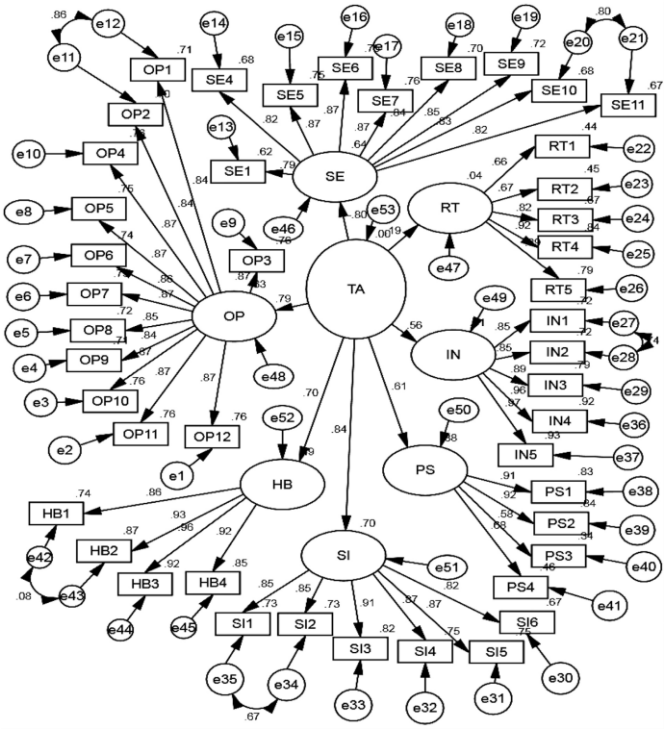


Fig 1. Standardized coefficients of7-factor structure of technology adoption (Magotra and et al, 2016).

b. Research Question

According to the purposes of this study, the research question is as follow:

What are the level of personal disposition of technology adoption in industrial company (Case Study: Iran Khodro Company) ?

c. Research Methodology

The approach of this research is use of quantitative and surveys. For this purpose, after a review of the literature, a model for measuring the level of personal disposition of individuals towards technology adoption was selected. Then the 46 questions were used as a data collection tool were specified, It is mentioned that the type of items was close form, and range of answer was 0 to 10. And 30 questionnaires were collected in this study in Iran Khodro Company. Statistical population includes specialists and experts of Iran Khodro Company which have at least five years experience in engineering, quality, research and development and maintenance departments and also they have at least bachelor's degree. The data collection tool used was questionnaire. The questions are closed type with grading scales of 10 . Sample size of this study is 30 questionnaires were distributed among experts. and also the sampling method was expert panel. Data analysis is via calculating the level of personal disposition of individuals towards technology adoption and data given form the expert' opinion. We also used SPSS software for some activities such as descriptive statistics and reliability and etc.

d. Model of Research:

Assessment model of personal disposition of individuals towards technology adoption was selected from an article that was written by (Irbha Magotra and et al, 2016) as follows in table1:

Table 1. Model of personal disposition of individuals towards technology adoption.

Factor name	No	Indicator
Optimism	1	The use of the latest technologies helps me in making necessary changes in my life smoothly.
	2	The use of the latest technologies allows me to do the things in the way I wanted to do them.
	3	The use of the latest technologies gives me more control over my day to day personal and professional
	4	The use of the latest technologies enables me to complete my tasks as per my requirements.
	5	The use of the latest technologies allows me to have control over the activities I wanted to perform both at personal as well as professional front.
	6	I find that I am doing more things now with the use of latest technologies than a couple of years ago.
	7	The use of latest technologies allows me to tailor things according to my own needs and requirements.
	8	I like the idea of using the latest technologies as it provides me with the flexibility of performing the tasks as per my requirements.
	9	The latest technologies allow me to perform the tasks more precisely and accurately.
	10	I like the idea of using the latest technologies a sit provides me with the flexibility of performing the tasks as per my requirements
	11	The latest technologies make me more proficient in carrying out my personal as well as professional activities.
	12	The use of latest technologies allows me to generate problem specific results whenever I need them.
Self efficacy	I am able to complete my tasks using the latest technologies	
	13	If I can call someone for help in case I got stuck.
	14	If I have seen someone else using it before trying it myself.
	15	If someone else helped me get started.
	16	If I have the built-in help facility for assistance.
	17	If someone show me how to do it first.
	18	If I have a lot of time to complete the work for which that technology is being used.
	19	If I have used similar kind of technology earlier to do the same job.
	20	If I have manuals for reference.
	21	If there is someone giving me step by step instructions.
Social influence	I use the latest technologies	
	22	As people who inspire me are using it.
	23	As persons who play vital role in my life want me to use it.
	24	As my friends want me to use it.
	25	As people who are valuable to me recommend me to use it.
	26	As my family members want me to use it.
	27	As other persons in my social circle want me to use it.
Innovativeness	28	The latest technologies allow me to work more in lesser time.

	29	I am keen to search about the latest technological developments taking place around me.
	30	I keep myself up with the latest technological developments which provide better results with fewer efforts.
	31	Other people come to me for advice on the usage and benefits of the latest technologies
	32	In general ,I am among the first in my social circle to acquire new technology whenever it appears
	33	As other persons in my social circle want me to use it.
Risk taking	I use the latest technologies even if	
	34	It is risky to roll back from it.
	35	It may not perform well and appropriate.
	36	It is not completely reliable.
	37	I know that I will not be completely compensated against the losses incurred in case of technology failure.
	38	It makes easy for others to keep a watch over me.
Habits	I feel that the regular use of latest technologies may	
	39	Make its use obvious for me
	40	Make me addicted to it
	41	Make me to use it even if the work can be done effectively without it
	42	Make me slave of it
Psychological resilience	43	It does not take me long to recover from the losses incurred due to the technology failure.
	44	In case of technology breakdown, I usually cope with it very easily.
	45	It is not hard for me to recoup when some failure occur, while using the latest technologies.
	46	I tend to bounce back quickly and use the latest technologies again even if I had faced some kind of technology failure earlier.

e. Validity and Reliability of Research Tools

The questionnaires were given to the experts for formal validity investigation, and the experts declared all the indicators have an appropriate validity to evaluate the personal disposition level of technology adoption in the car industry. Meanwhile, reliability of the questionnaire was confirmed by previous researcher that has prepared the original model because the amount of Cronbach's alpha is over 0.7.

4. FINDINGS

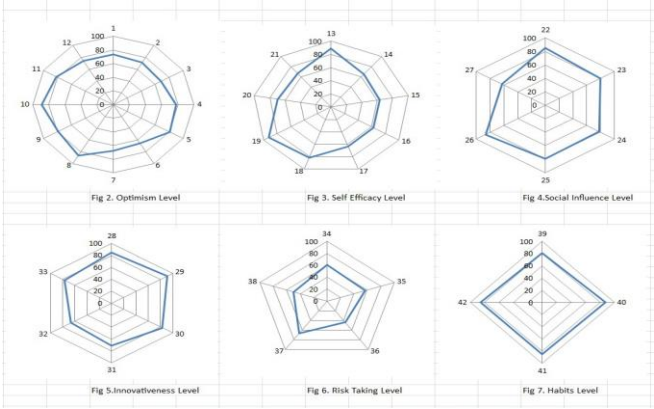
a. Descriptive Statistics of the Research Population

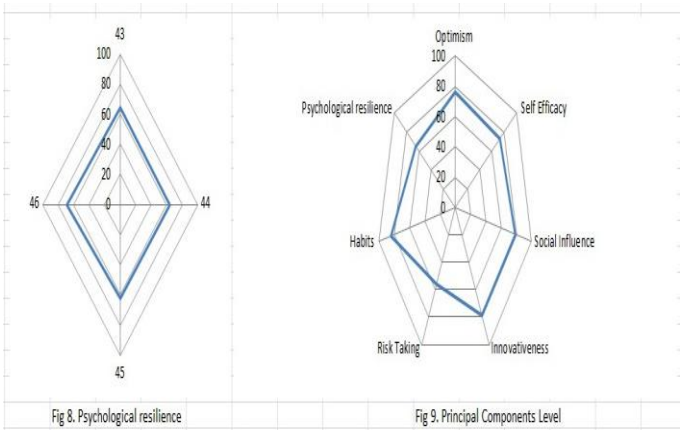
The population of statistics shows that about 40% of them are between 30 to 40 years old, and 60% of them are between 40 to 50 years old. And also, respectively, 20%, 60%, and 20% of them have a bachelor, master and Ph.D degree. And 20%, 70% and 10% of population respectively have 5 to 10 years, 10 to 20 years, and more than 20 years work experience.

b. Results of Individual Innovation Level:

Considering Assessment of personal disposition of individuals towards technology adoption in Iran Khodro company by experts, it was found that the company has the highest capability in habits (84.83%) Also, it has the lowest capability in risk taking (55.73%).

In addition, The status of the capabilities are separately shown in Figures No.2 to No.8 and also the level of principal components is shown in Fig No.9 , and finally the total evaluation of personal disposition level of technology in Iran Khodro company is shown in Fig 10 and Tab 2 .





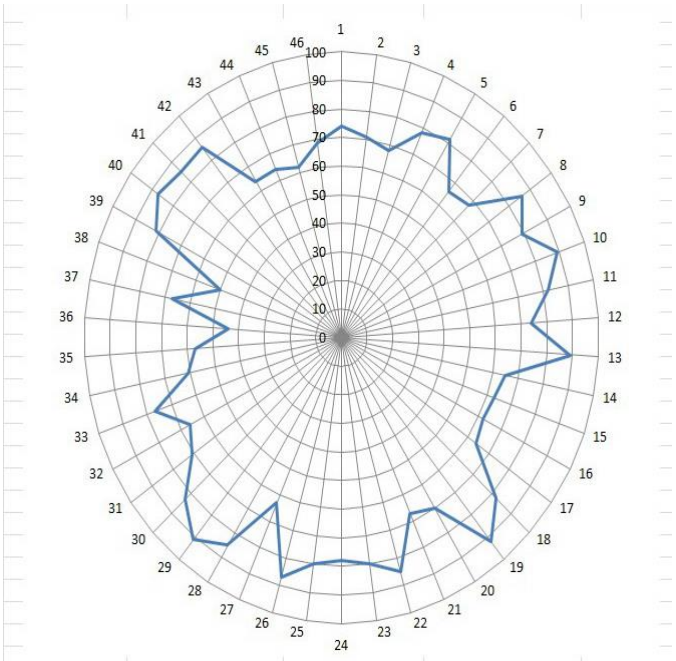


Table 2. Indexes and components of personal disposition level of technology adoption in Iran Khodro Company.

Factor name	No	Indicator	Indicator Scores	Components Scores	Total Score of TA
Optimism	1	OP1	74%	76.39%	73.15 %
	2	OP2	71%		
	3	OP3	68%		
	4	OP4	78%		
	5	OP5	81%		
	6	OP6	66%		
	7	OP7	68%		
	8	OP8	86%		
	9	OP9	79%		
	10	OP10	89%		
	11	OP11	82%		
	12	OP12	74%		
Self Efficacy	13	SE1	89%	72.78%	
	14	SE2	65%		
	15	SE3	63%		
	16	SE4	62%		
	17	SE5	64%		
	18	SE6	82%		
	19	SE7	92%		
	20	SE8	70%		
	21	SE9	67%		
Social Influence	22	SI1	85%	79%	
	23	SI2	80%		
	24	SI3	78%		
	25	SI4	80%		
	26	SI5	87%		
	27	SI6	63%		
Innovativeness	28	IN1	85%	78.72%	
	29	IN2	91%		
	30	IN3	83%		
	31	IN4	71%		
	32	IN5	66%		
	33	IN6	77%		
Risk taking	34	RT1	61%	55.73%	
	35	RT2	57%		
	36	RT3	44%		
	37	RT4	67%		
	38	RT5	50%		
Habits	39	HB1	81%	84.83%	
	40	HB2	87%		
	41	HB3	85%		
	42	HB4	86%		
Psychological resilience	43	PS1	64%	64.58%	
	44	PS2	64%		
	45	PS3	62%		
	46	PS4	69%		

5. Conclusion

According to the results, obtained indicators in different dimensions based on the research model are as follows:

The results show that the highest dimensions are habits (84.83%) , and Social Influence (79%), and the lowest ones are Risk taking (55.73%), and Psychological resilience(64.58%) .Though to strengthen these dimensions the beyond offers are suggested:

6. Recommendations

1. For improving the capability of new technology it is suggested that organizational systems should be studied before using new technology with reliable engineering science and the capacity must be supplied if it is needed. If the organizational system shows any resistance again that new technology, some reforms must be done. Moreover to increase the reliability, it is better to use parallel systems instead of series one.
2. It is suggested that organization use the technologies which have the higher capability of repair and services. By doing this the experts use the new technology with higher confidence.
3. It is suggested that by implementing the educational courses, the risk power of experts will improve and they will use the new technologies with higher confidence from the beginning.
4. To compensate the damage which is made by technologies, it is suggested that organization prepares the systems and structures that increase the system to compensate the failures and expenditures. Also they should use the technologies which the probability of making damages through it is low. By doing so, the risk power of experts will improve after a while.
5. It is suggested that the FMEA will be done for the new technologies before using them in the organization. Through this, it is possible to define some actions to reduce or eliminate the damages after identifying and prioritizing of the potential failure mode and so, security coefficients and satisfaction of organization experts from system and new technologies will improve and the errors will be modified in a shorter time. In fact, doing FMEA system is an action not reaction. It is a preventive action against the events that may happen in the future. Certainly the expenditure of this is lower in the initial stages of design and selection of new technologies. It may cause fewer problems for experts that use the technology in the organization.
6.It is suggested that some classes like industrial psychology, problem solving methods, technological innovations and any other courses which make the experts familiar with the new technologies are added. For this goal organizations can cooperate with universities which have these courses. By this way not only the relation between science and industry will be well established, but also the experts gain the essential skills.
7. It is suggested that the process of identifying and acquiring technology will be done such a way that all of the experts who are related to the process learn from the main source of technology and dependence of each staff to knowledge of others will reduce because it will reduce in the organization from top to down after technology transfer.
8. It is recommended to access to the innovations and new technologies in domestic and international market by using the techniques of technology monitoring. Although, being leadership in technology increased costs, But if the company can use the technologies efficiently, they can have some advantages such as the following: produces the dominant product, being standard of market and etc.

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