The Impact of Natural Culture on New Technology Adoption by Firms: A Country Level Analysis

Pınar Özbilen

***Abstract*—The objective of this paper is to discover and explain the effect of national culture on the adoption of new technology by firms. Hofstede's cultural framework was employed in order to measure national cultural differences. The data of new technology adoption at firm-level on a country basis was obtained from The Global Information Technology Report, 2016. Analyses of the hypotheses were conducted using one-way ANOVA. The results reveal that power distance, uncertainty avoidance, individualism and long-term orientation dimensions have a satisfactory influence on the adoption of new technology at firm-level; however, the dimension of masculinity does not affect it. The relationship between long-term orientation and the adoption of new technology has seldom been researched. The contribution made to the literature by this study is to provide findings for the long-term orientation dimension. This study shows that there is adequate positive impact on long-term orientation on new technology adoption.**

***Index Terms*—National culture, technology adoption, innovation, resistance to change.**

I. Introduction

As organizational change is regarded as essential in the contemporary business world for the survival of firms, obstacles challenging successful organizational change have been widely analyzed in change management literature. In particular, resistance to change has been accepted as one of the major problems for organizational change [1], [2]. On the other hand, there have also been various studies focusing on the constructive nature of resistance to change [2]-[5].

Often regarded as change, technology adoption naturally encounters resistance for many reasons. Ref. [6] listed political power, unions, regulations and laws as sources of resistance to the adoption of new technology. As an example, Trade Unions can be deemed as a hindrance for the adoption of new technologies, as they act to protect their members from labor-saving schemes [6]. Moreover, natural culture can be another source of resistance to technology adoption. Ref. [7] stated that many sociological studies have been carried out on how technology adoption is affected by a society's characteristics. Ref. [8] emphasized resistance to technology as being highly relevant and as the "interaction between the technology and its social context"; however, there are a limited number of studies on the effect of national culture on technology adoption [9].

To explore the effect of national culture on the extent of technology adoption, the focus of the study was on Hofstede's cultural dimensions and the relationship between resistance to change and national culture. The link between technology adoption and national culture will be examined by assessing those studies that focus on the effect of national culture on resistance to change. Since technology adoption is a form of change initiative, it is assumed that, by examining the association between national culture and resistance to change, it will provide considerable insight into the effects of national culture on the adoption of new technology. Moreover, in order to explain the relationship between firm-level new technology adoption and national culture, this study draws on also benefitted from the "diffusion of innovation theory" [11] and the discussion of [12] concerning the characteristics of cultures in business life. Ref. [11] mentioned that organizational characteristics influence organizational innovativeness. The main premise of this study is that national culture shapes the organizational characteristics that affect organizational innovativeness. It is widely known that national culture influences organizational transactions. Ref. [12] explained the business characteristics of different types of cultures, and maintained "Nationality determines rationality" [12].

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Pınar Özbilen is with the Bogazici University, Istanbul, Turkey (e-mail: pinar.yozgatli@boun.edu.tr).

II. Literature

As mentioned above, the relationship between national culture and new technology adoption at firm-level is explained in this study through the relationship between resistance to change and national culture. Therefore, in this section, we briefly touch on relevant literature, including several conceptual and empirical studies related to the association between national culture, resistance to change and technology adoption. The findings mentioned in this part facilitate our discussion on the effect of national culture on new technology adoption at firm-level.

The review the relevant literature shows that the earliest study that focused on the relationship between national culture and resistance to change belongs to [13]. The authors argued that national cultures with high individualism, low power distance and low uncertainty avoidance facilitate adaptation to change. On the other hand, national cultures with a high power distance level, a high level of collectivism and high uncertainty avoidance more likely tend towards showing resistance to change [14] and [15] did not observe any significant relationship between resistance to change and national culture, although there are some studies [16]-[19] which support the idea that having high uncertainty avoidance increases the possibility of resistance to change. In parallel with these studies, [20] remarked that societies with a low degree of uncertainty avoidance have a tendency to show

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more tolerance towards change, and therefore they are expected to be less resistant to change. Nevertheless, when the effect of long-term orientation is considered, [20] contradict the opinions of [13]. The former study highlighted the positive relationship between long-term orientation and resistance to change. In contrast, [13] characterize high long-term oriented countries with adaptiveness skill and imply a negative relationship between long-term orientation and resistance to change. Additionally, [21] attributed the resistance of Indian management to change to the high power distance and collectivist culture of India. The authors support views of [13] in this respect.

Research by [22] attracts attention among those studies that examine the relationship between national culture and the adoption of new technology. By comparing the U.S. with Japan, [22] found that individualistic societies are more likely to lead in the process of technology development, and that it takes less time to accept and implement new ideas, products, and processes in such societies. The studies of [23] and [24] also support these findings; moreover, [22] stated that countries with high power distance are expected to be very slow in developing new products and services. Ref. [25] also explained the relationship between national culture and new technology adoption. Ref. [25] published a study that examined the effect of Hofstede's cultural dimensions on adoption of Information and Communication Technology. Their study suggested that power distance and uncertainty avoidance dimensions are negatively correlated with ICT adoption. Furthermore, they showed that individualism is positively linked with ICT adoption, while masculinity has no such impact. Additionally, some studies conducted in the field of ERP adoption provided several insights concerning the link between the characteristics of natural culture and technology adoption. Ref. [26] stated that high uncertainty avoidance leads to a high level of bureaucracy and consequently additional power over employees by their employers, which consequently has an adverse effect on ERP adopters. A subsequent study by [23], proposed that cultures that are more universalistic and individualistic have a higher likelihood of successfully adopting technology. Furthermore, the authors noted that cultures with high power distance and low-achievement orientation are less likely to be successful at technology adoption. Moreover, [26] argued that senior employees with high power distance values regard information as a source of power over their employees; accordingly, they limit information sharing, which in turn negatively affects enterprise resource planning (ERP) adoption. Furthermore, [28] conducted a study in Saudi Arabia that examined the impact of national culture on user acceptance of (ERP) systems. The study showed that while uncertainty avoidance negatively influences the perceived user resistance, power distance and individualism have no effect.

III. Hypotheses Development

[12] remarked that organizations in high power distance cultures centralize power in a few hands as much as possible. He also remarked that centralization is popular in such organizations. On the other hand, he described organizations in low power distance cultures as fairly decentralized with flat hierarchical pyramids and limited numbers of supervisory personnel. At this point, the effect of centralization on innovation and new technology adoption should be considered. Drawing on the Diffusion of Innovation Theory by [11], it is argued that centralization, which is one of the main organizational characteristics influencing the organizational innovativeness, has a negative effect on new technology adoption. Ref. [11] claimed, "The more that power is concentrated in an organization, the less innovative the organization is". He proposed this argument as, in a centralized organization, the range of new ideas considered by an organization is restricted to a few strong top leaders and in a centralized organization, "top leaders are poorly positioned to identify operational-level problems, or to suggest relevant innovations to meet these needs" [11] (p. 358). In brief, he remarked that the initiation of innovations in a centralized organization is less frequent than in a decentralized organization. The initiation stage of innovation is defined as the adoption stage, which depends on whether or not the creation of the decision related to innovation will be used [11]. Hence, the following hypothesis is developed:

H1: Countries with a high power distance score will show a lower rate of new technology adoption at firm-level than countries with a low power distance score.

In the initiation stage of the innovation process, the creation of a perceived need for innovation is the first step, which includes 1) identifying and prioritizing needs and problems and 2) searching the organization's environment to find the most useful innovations to meet these organizational problems [11]. All these are essential for technology adoption. This stage requires extensive communication and feedback both within and outside the organization. Moreover, [11] stated that if an organization has a higher degree of network interconnectedness (the degree to which the units in a social system are linked by interpersonal networks), new ideas can be easily communicated among an organization's members, and as a result, organizational innovativeness increases. Nonetheless, in collectivist cultures, feedback is indirect and relationships with colleagues are cooperative for in-groups, whereas they are cold or even hostile towards out-groups [12]. Consequently, weaker organization-wide communication may be highly observed in collectivist cultures. We do not envisage higher degrees of network interconnectedness in an organization that is part of a high collectivist culture. Hence, in collectivist cultures it can be assumed that this first stage will not function properly in the innovation process and the following hypothesis is formulated:

H2: Countries with a high individualism score will show a higher rate of new technology adoption at firm-level than countries with a low individualism score.

Organizations in high uncertainty avoidance societies are characterized by formalizations because they have developed rules and procedures to reduce uncertainty [12]. In this context, [11] stated, "Formalization acts to inhibit the consideration of innovations by organization members";

hence, the following hypothesis was generated:

H3: Countries with a high uncertainty avoidance score will show a lower rate of new technology adoption at firm-level than countries with a low uncertainty avoidance score.

Ref. [12] suggested that there is considerable emphasis on adaptiveness in the main work values of long-term orientation. The authors described normative societies as those that score low on this dimension and prefer to maintain time-honored traditions and norms, while viewing societal change with suspicion. On the other hand, those with a culture that scores high in this dimension, take a more pragmatic approach [12]. Due to their pragmatic approach and an ability to adapt traditions easily to changing conditions, countries with high long-term orientation levels are more likely to adopt new technologies. Moreover, cultures with long-term orientation emphasize "learning" as one of main work values, which may be associated with "complexity – the degree to which an organization's members possess a relatively high level of knowledge and expertise" [11]. Since Organizational culture is defined as the pattern of shared assumptions, values and beliefs [29], it is inferred that learning is one of the primary aspects of the organizational culture in these countries. Additionally, national culture correlates with organizational culture and organizational culture correlates with individuals' values and beliefs [30]. At this point, the definition of Motivation in learning is used, in order to pave the way for our discussion. Motivation in learning is described as the desire to use the knowledge and skills mastered in associated learning activities from the job [30]. It is expected that organizations in cultures with high long-term orientation have higher degrees of complexity, since emphasis on learning as a main work value boosts the knowledge and expertise of employees by increasing motivation in learning. The study by [11] opined that an organization's learning culture has a significant positive effect on motivation in learning. [12] stated, "Complexity encourages organizational members to grasp the value of innovations." Therefore, we can expect a positive relation between the adoption of new technology and long-term orientation. The following hypothesis is formulated to measure the anticipated relation discussed above:

H4: Countries with a high long- term orientation score will show a higher rate of new technology adoption at firm-level than countries with a low long- term orientation score.

Ref. [12] defined countries with a high masculinity score in this dimension as societies that generally pay attention to competition, achievement and success, and maintain this kind of orientation throughout the education system and organizational life. Therefore, it is expected that those countries with a high masculinity score have a greater tendency to adopt new technology in order to be the best in the market. This argument implies that they intend to allocate more of their resources to innovative solutions. This condition, which may be associated with organizational slack [11], has a positive relationship with organizational innovativeness, as described by innovation diffusion theory. In light of all the discussions mentioned above, the following hypothesis is obtained:

H5: Countries with a high masculinity score will show a higher rate of new technology adoption at firm-level than countries with a low masculinity score.

IV. Methodology

As a measure of the extent to which a country's firms adopt new technology, this study uses the firm-level technology absorption index provided by World Economic Forum (The Global Information Technology Report, 2016). To capture this data, 13000 business leaders in 148 economies were asked to rate "In your country, to what extent do businesses adopt new technology" according to a 7-point Likert scale. The data on firm-level technology absorption, as given in the Global Information Technology Report (2016), includes an average of the data collected in 2013 and 2014. The data of culture dimension on a country basis is represented by Hofstede indices available at http://geerthofstede.com/research-and-vsm/dimension-data-matrix/. Hofstede's culture framework has been the subject of much criticism [31]. Nevertheless, this framework is preferred, as it enables a comparison of our results with previous studies. Furthermore, it is widely accepted in the relevant social science literature and was generated as a result of an exhaustive study that investigated the effect of culture on values in the workplace. A total of 61 countries have full data for each culture dimension and, hence our sample size is the corresponding figure.

In the literature, many other factors influencing technology adoption are extensively mentioned. Education level is highly regarded as having positive influence on technology adoption [7], [25], [32]-[34]. Furthermore, the opposing attitudes of trade unions towards new technology adoption were mentioned in several studies as a factor that impacted on adoption decisions [35]-[38]. Additionally, technological infrastructure has been used many researchers and is considered as an important determinant influencing technology adoption decisions [39]-[42]. Likewise, the income level of a country is an important aspect that should be expressly taken into account when discussing adoption decisions (e.g. [25], [43], [44]). Therefore, in order to eliminate parameter estimation bias, which occurs as a result of the exclusion of other related variables mentioned in the literature, the variables measuring education level and income level on a country basis are controlled in our regression models. As there is no recent or adequate data about Trade Unions at country level (limited to 31 countries), it is not employed as a control variable in this study. In addition, any variable representing technological infrastructure is not incorporated, as it can be assumed that the economic power of a country has a far-reaching effect on its technological infrastructure. The income level is represented by a dummy variable, which has two categories. The dummy variable for countries including low-income and lower middle-income groups is assigned 0, while for

countries including upper middle-income and high-income groups, the value one (1) is assigned. For the categorization of the countries according to their income levels, the World Bank's income classification is used. The gross tertiary enrolment rate of a country is employed as a proxy for a country's education level. This rate represents the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the tertiary education level. The most recent data of the tertiary education level has been accumulated from many sources by the World Economic Forum and is also provided in The Global Information Technology Report, 2016.

The hypotheses are analyzed using One-way ANOVA. For one-way ANOVA analyses, the categorization of culture variables are based on the median point of each variable and it is suggested that the cut-off point is median [45]. In point of fact, the results gained from another one-way ANOVA show that the difference between the low and the high group is significant for every dimension. It can therefore be deduced that creating two groups is appropriate. In order to incorporate the control variables, further analyses are made using Multiple Regression. To identify multicollinearity among independent variables, correlation analysis is conducted. As can be seen from Table 1, the Education level variable has a high correlation with the income level variable, which may create a problem with multicollinearity. Moreover, the Individualism variable is highly correlated with the Power distance variable. It should be noted that [12] mentioned that these two dimensions have a tendency to be negatively correlated. This is because in cultures in which people are dependent on groups, as in collectivist cultures, people are most likely to be dependent on power figures [11]. This also poses a multicollinearity problem. Therefore, these variables are incorporated into the regression models separately. Based on our earlier discussion, the anticipated relationship between cultural dimensions and new technology adoption is represented in the following multiple regression model, where TechAdopt represents the average firm-level new technology adoption, the α and βs are parameters to be estimated, PD is power distance, IND is individualism, MAS is masculinity, UA is uncertainty avoidance, EDU is the level of education, INCOME is the level of income and u is the random error term with standard assumptions. The subscript j denotes countries:

$$TechAdopt_j = \alpha + \beta_1 PD_j + \beta_2 IND_j + \beta_3 MAS_j + \beta_4 UA_j + \beta_5 LT_j + \beta_6 EDU_j + \beta_7 INCOME_j + u_j$$

TABLE I: CORRELATIONS BETWEEN HOFSTE DE DIMENSIONS AND CONTROL VARIAB

		1	2	3	4	5	6	7
1	Education							
2	Income	.614**						
3	PD	-.341**	-.281*					
4	IND	.341**	.310*	-.637**				
5	MAS	-.196	-.027	.178	.029			
6	UA	.152	.178	.189	-.178	.021		
7	LT	.154	.152	.021	.104	.028	-.039	
8	Technology Adoption	.317*	.320*	-.543**	.501**	-.107	-.347**	.286*

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

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

V. RESULTS

Except for the Masculinity variable, correlation results are in line with our hypothesis (See Table I); however, the long-term orientation dimension has very low correlation with new technology adoption. The ANOVA results (see Table II) indicate that the difference between the low and the high group is significant for power distance, individualism and uncertainty avoidance dimensions, in terms of new technology adoption rates; however, the masculinity and long term orientation dimensions do not show any significant difference. Countries with lower power distance and uncertainty avoidance tend to have higher adoption rates compared with the countries with higher levels of power distance and uncertainty avoidance. Conversely, the countries with higher individualism tend to score higher on adoption rates, relative to the countries with lower individualism. These effects support Hypothesis 1, Hypothesis 2 and Hypothesis 3.

TABLE II: ONE-WAY ANOVA RESULTS

Dependent Variable (Technology Adc	PD	IND	MAS	UA	LT
Mean (Low)	5.31	4.740	5.010	5.250	4.930
Standard Deviation (Low)	0.67	0.550	0.660	0.670	0.670
Number of Countries	30	30	30	30	30
Mean (High)	4.73	5.220	5.030	4.790	5.110
Standard Deviation (High)	0.57	0.690	0.710	0.618	0.681
Number of Countries	31	31	31	31	31
F (1,59)	13.461*	11.301*	0.008	7.639*	1.07

*Significant at 1% level

The regression results largely conform to the results of ANOVA. The findings show that there is no support for Hypothesis 5. In the model without control variables (Model 1 and Model 2), four dimensions have significant coefficients; namely, power distance, uncertainty avoidance, individualism and long-term orientation dimensions. The signs of these dimensions are as expected and support our first four hypotheses. With the control of the education level and income level (Model 3 and Model 4), the results remain same. To summarize, the regression analyses support the first four hypotheses.

TABLE III: REGRESSION RESULTS FOR TECHNOLOGY ADOPTION AND CULTURAL DIMENSIONS(N=61)

	Model 1 Without Control Variables and PD	Model 2 Without Control Variables and IND	Model 3 Including Control variables without PD	Model 4 Including Control variables without IND
Parameter	Unstandardized Coeffcients (significance)			
Constant	4.81 (0.000)	6.073 (0.000)	4.591 (0.000)	5.643 (0.000)
PD	-	-0.16 (0.000)	-	-0.014 (0.000)
IND	0.013 (0.000)	-	0.01 (0.005)	-
MAS	-0.004 (0.255)	-0.001 (0.836)	-0.003 (0.383)	0.000 (0.836)
UA	-0.008 (0.018)	-0.007 (0.022)	-0.009 (0.004)	-0.009 (0.006)
LT	0.007 (0.030)	0.008 (0.006)	0.006 (0.062)	0.007 (0.018)
Model Summary				
R^2	0.387	0.44	0.436	0.481
F for change in R^2	-	-	7.411 (0.000)	9.23 (0.000)

VI. Discussion

The central hypothesis of this study is that a nation culture has an impact on new technology adoption. The results of ANOVA and regression analyses support this central hypothesis. It was therefore concluded that firm-level new technology adoption decisions across countries are significantly correlated with cultural factors.

With regard to the power distance dimension, as hypothesized, a negative relationship has been observed. The analyses indicate that organizations in high power distance cultures tend to show the lower level of new technology adoption. Our finding related to the relation between power distance and new technology adoption is mostly in line with findings and discussions of similar previous studies [19], [22], [23], [25], [27], [46]. Addition to the centralization, this result may be attributed to resistance to change. The negative relationship between power distance and resistance to change was also widely mentioned in the literature [13], [17], [21].

As far as the impact of the Individualism dimension on new technology adoption is concerned, a positive relationship has been identified. This means that in a highly collectivist culture, organizations have lower inclination to use new technology. This could be due to managers in collectivist cultures paying little attention to new management ideas and, unlike managers in individualistic cultures, being less keen on putting them into the practice [19]. This conclusion shows parallels with the related literature [22], [23], [25], [46], in terms of the relationship between technology adoption (or acceptance) and collectivist culture. While formulating the relevant hypothesis, we based our argument on weakness in links among interpersonal networks in highly collectivist cultures. Resistance to change may be another reason. New technology, as a form of change, is expected to attract resistance in highly collectivist cultures. It is widely acknowledged in the literature that resistance to change is very likely to be seen in highly collectivist cultures [13], [21].

Uncertainty avoidance has attracted much attention in the field of technology adoption. Our results strongly support the claim that organizations functioning in cultures with high uncertainty avoidance level are expected to show lower levels of new technology adoption. In accordance with our results, the adoption of new technologies, such as Enterprise Resource Planning and Information and Communication Technologies, has been seen to negatively correlate with the uncertainty avoidance dimension [25], [26], [28]. Our study supplements their findings in a way that, regardless of the type of new technology, uncertainty avoidance has a negative impact on technology adoption. Furthermore, some scholars have robustly argued the existence of a negative relationship between uncertainty avoidance dimension and technology acceptance or technology adoption [19], [47], [48]. In previous sections of the current paper, it has been mentioned that societies with high uncertainty avoidance levels are characterized by formalizations, and proposed that these formalizations result in new technology adoption being restricted. Moreover, we identified more resistance to change in high uncertainty avoidance societies [13], [16]-[20], which may lead to a lower likelihood of new technology adoption [49].

So far, the impact of long-term orientation dimension on new technology adoption has not been extensively analyzed. The most recent study to analyze the influence of long-term orientation on technology adoption was conducted by [46], and this indicated that long-term orientation significantly correlates with e-government development and this result is parallel with our findings. Our analyses revealed that long-term orientation has a positive influence on firm-level new technology adoption; contrary to the view that long-term orientation has negative impact on new technology adoption [25], [49]. Our study differs from that of [46], in terms of unit of analysis and the type of technology adopted. Therefore, we contribute to the literature by offering support for the relationship between long-term orientation dimension and firm-level new technology adoption.

Our results do not provide any support for the relationship between masculinity and new technology adoption. This result may be attributed to ignorance of local competition intensity. In this study, it is assumed that with intense local competition, organizations in countries with high masculinity level might have sufficient stimuli to adopt new technologies in order to be best in the sector. The role of intensity of local competition in the relationship between masculinity and technology adoption could well be a worthwhile topic for future research. Our findings are similar with those of [25] and [46]; however, the study of [47] revealed that masculinity does have an impact on e-parliament adoption.

VII. Conclusion

Undoubtedly, in the current business environment, only those organizations that select appropriate technology and adopt it efficiently can continue to be in the game. At that point, we should ponder the factors influencing efficient technology adoption. For example, [50] extensively discussed in his study that multinational corporations face some culture-based differences in terms of the effectiveness of international technology transfer. Therefore, multinational corporations should seriously consider the attributes of a national culture in terms of its receptivity to technological change. In point of fact, the results of our study suggest that professionals should also pay attention to cultural barriers to technology adoption. This suggestion is in line with the discussion in [49]'s study. He briefly mentioned that national culture is one of the most important factors in technology management. For example, in societies demonstrating a high level of power distance, following the introduction of new technology, managers should understand the new power positions within the organization. The introduction of new technology may diminish the power previously held by individuals and consequently could be regarded as a threat to their power [49]. Power holders with high power distance values deem information to be a source of power [27]. New technology could make information, formerly only in their hands, public and from their perspective this would means a loss of power. As a result, they resist sharing information and attempt to prevent the dissemination of knowledge. Additionally, these inappropriate actions may also contribute to the resistance of new technology by their subordinates.

Concisely, power holders both resist new technology and cause resistance to it by their employees. One way to eliminate this obstacle would be to create an organizational culture and leadership style that decreases the level of power distance within the organization. In this way, the adverse effect of power distance on technology adoption and innovation diffusion can be reduced. High uncertainty avoidance is also crucial for successful technology management. Managerial practices should convince employees that new technology offers many advantages to their organizations and for the individuals within them. Furthermore, they ought to make sure that there is no blind point in the eyes of employees concerning new technology. This is also an important issue for the organizations that sell new technological products. They have to paint a clear picture in the minds of their customers regarding the new technology. Our final suggestion is related to the collectivism dimension. As we previously stated, it can be expected there to be weak inter-group links in organizations that operate in highly collectivist culture. In order to carry out successful technology management, organization-wide information sharing and collaboration is absolutely vital. Therefore, organizations in highly collectivist cultures should create and maintain an organizational culture and leadership style that supports the development of strong inter-group relations.

REFERENCES

[1] D. G. Erwin and A. N. Garman, "Resistance to organizational change: Linking research and practice," *Leadership & Organization Development Journal*, vol. 31, no. 1, pp. 39-56, 2010.

[2] R. Thomas and C. Hardy, "Reframing resistance to organizational change," *Scandinavian Journal of Management*, vol. 27, no. 3, pp. 322-331, 2011.

[3] L. W. Ford, J. D. Ford, and A. D. Amelio, "Resistance to change: The rest of the story," *The Academy of Management Review*, vol. 33, no. 2, pp. 362-377, 2008.

[4] D. Waddell and A. S. Sohal, "Resistance: A constructive tool for change management," *Management Decision*, vol. 36, no. 8, pp. 543-548, 1998.

[5] L. Perren, "Resistance to change as a positive force: its dynamics and issues for management development," *Career Development International*, vol. 1, no. 4, pp. 24-28, 1996.

[6] E. J. F. Canton, H. L. F. de Groot, and R. Nahuis, "Vested interests, population ageing and technology adoption," *European Journal of Political Economy*, vol. 18, no. 4, pp. 631-652, 2002.

[7] J. MacVaugh and F. Schiavone, "Limits to the diffusion of innovation: A literature review and integrative model," *European Journal of Innovation Management*, vol. 13, no. 2, pp. 197-221, 2010.

[8] K. Bruland, "Patterns of resistance to new technologies in Scandinavia: An historical perspective," *Resistance to New Technology*, pp. 125- 146, 1995.

[9] R. M. Steers, A. D. Meyer, and C. J. Sanchez-Runde, "National culture and the adoption of new technologies," *Journal of World Business*, vol. 43, no. 3, pp. 255-260, 2008.

[10] T. M. Egan, B. Yang, and K. R. Bartlett, "The effects of organizational learning culture and job satisfaction on motivation to transfer learning and turnover intention," *Human Resource Development Quarterly*, vol. 15, no. 3, pp. 279-301, 2004.

[11] E. M. Rogers, *Diffusion of Innovations*, 5th ed. New York, U.S: Free Press, 2003.

[12] G. Hofstede, G. J. Hofstede, and M. Minkov, *Cultures and Organizations: Software of the Mind*, 3rd ed. New York, USA: McGraw-Hill, 2010.

[13] A. W. Harzing, and G. Hofstede, "Planned change in organization: The influence of national culture," *Research in the Sociology of Organizations*, vol. 14, pp. 297-340, 1996.

[14] C. Kirsch, J. Chelliah, and W. Parry, "The impact of cross-cultural dynamics on change management," *Cross Cultural Management: An International Journal*, vol. 19, no. 2, pp. 166-195, 2012.

[15] U. Pihlak and R. Alas, "Resistance to change in Indian, Chinese and Estonian organizations", *Journal of Indian Business Research*, vol. 4, no. 4, pp. 224-243, 2012.

[16] A. Al-Kandari and T. K. Gaither, "Arabs, the west and public relations: A critical/cultural study of Arab cultural values," *Public Relations Review*, vol. 37, no. 3, pp. 266-273.

[17] C. Acosta, V. J. Leon, C. Conrad, R. Gonzalez, and C. O. Malave, "Case study on culture and the implementation of manufacturing strategy in Mexico," *Journal of Manufacturing Systems*, vol. 23, no. 3.

[18] K. Mellahi, "National culture and management practices: The case of gulf cooperation council counties" *International Management: Theories and Practices*, London, pp. 88-105, 2003.

[19] G. Hofstede, *Culture's Consequences: Comparing Values, Behaviors, Institutions, And Organizations Across Nations*, 2nd ed. California, USA: Sage Publications, 2001.

[20] C. Rees and R. Althakhri, "Organizational change strategies in the Arab region: A review of critical factors," *Journal of Business Economics and Management*, vol. 9, no. 2 pp. 123-132, 2008.

[21] J. Bhatnagar, P. Budhwar, P. Srivastava, and D. S. Saini, "Organizational change and development in India: A case of strategic organizational change and transformation," *Journal of Organizational Change Management*, vol. 23, no. 5, pp. 485-499, 2010.

[22] P. A. Herbig and F. Palumbo, "The effect of culture on the adoption process: A comparison of Japanese and American behavior," *Technologies Forecasting and Social Change*, vol. 46, no. 1, pp.71-101, 1994.

[23] B. Arogyaswamy and W. Elmer, "Technology absorption in emerging nations," *Journal of East-West Business*, vol. 10, no. 4, pp. 79-104, 2005.

[24] P. Ifinedo, "Applying uses and gratifications theory and social influence processes to understand students' pervasive adoption of social networking sites: Perspectives from the Americas," *International Journal of Information Management*, vol. 36, no. 2, pp.192-206, 2016.

[25] A. Erumban and S. B. de Jong, "Cross-country differences in ICT adoption: A consequence of Culture?" *Journal of World Business*, vol. 41, no. 4, pp. 302-314, 2006.

[26] Y. M. Everdingen and E. Waarts, "The effect of national culture on the adoption of innovations," *Marketing Letters*, vol. 14, no. 3, pp. 217-232, 2003.

[27] J. Rajapakse and P. Seddon, "ERP adoption in developing countries in Asia: a cultural misfit," *in Proc.the 28th Information Systems Seminar in Scandinavia*, 2005, pp. 6-9.

[28] H. Alhirz and A. S. M. Sajeev, "Do cultural dimensions differentiate ERP acceptance? A study in the context of Saudi Arabia," *Information Technology & People*, vol. 28, no. 1, pp. 163-194, 2015.

[29] E. H. Schein, "Coming to a new awareness of organizational culture," *Sloan management review*, vol. 25, no. 2, pp. 3-16, 1984.

[30] K. M. Law and K. B Chuah, "Organizational learning as a continuous process, DELO," *PAL Driven Organizational Learning: Theory and Practices*, pp. 7-29, 2015.

[31] C. Hampden Turner and F. Trompenaars, "Response to geert hofstede," *International Journal of Intercultural Relations*, vol. 21, no. 1, pp. 149-159, 1997.

[32] D. Comin and B. Hobijn, "Cross-country technology adoption: Making the theories face the facts," *Journal of monetary Economics*, vol. 51, no. 1, pp. 39-83, 2004.

[33] G. D. Wozniak, "The adoption of interrelated innovations: A human capital approach," *Review of Economics and Statistics*, vol. 66, no. 1, pp.70-79, 1984.

[34] G. D. Wozniak, "Human capital, information, and the early adoption of new technology," *Journal of Human Resources*, vol. 22, no. 1, pp. 101-112, 1987.

[35] K. E. Lommerud, F. Meland, and O. R. Straume, "Globalisation and union opposition to technological change," *Journal of International Economics*, vol. 68, no. 1, pp. 1-23, 2006.

[36] N. Menezes-Filho and J. Van Reenen, "Unions and innovation: A survey of the theory and empirical evidence," *CEPR Discussion Paper*, no. 3792, 2003.

[37] A. N. Link and D. S. Siegel, "Unions and technology adoption: A qualitative analysis of the use of real-time control systems in U.S. coal firms," *Journal of Labor Research*, vol. 23, no. 4, pp. 615-630, 2002.

[38] S. Dowrick and B. J. Spencer, "Union attitudes to labor-saving innovation: When are Unions luddites," *Journal of Labor Economics*, vol. 12, no. 2, pp. 316-344, 1994.

[39] B. Zainab, M. A. Bhatti, F. B. Pangil, and M. M. Battour, "E-training adoption in the Nigerian civil service," *European Journal of Training and Development*, vol. 39, no. 6, pp. 538-564, 2015.
[40] M. G. Aboelmaged, "Predicting e-readiness at firm-level: An analysis of technological, organizational and environmental (TOE) effects on e-maintenance readiness in manufacturing firms," *International Journal of Information Management*, vol. 34, no. 5, pp. 639-651, 2014.
[41] M. Alarcon-del-Amo, C. Lorenzo-Romero, E. Constantinides, Y. L Eldon, S. Loh, C. Evans, and F. Lorenzi, "Application of social media tools by retailers," *Organizations and Social Networking: Utilizing Social Media to Engage Consumers*, pp. 214-235. Eds. USA: IGI Global.
[42] S. Jarvis-Selinger, E. Chan, R. Payne, K. Plohman, and K. Ho, "Clinical telehealth across the disciplines: Lessons learned," *Telemedicine and e-Health*, vol. 14, no. 7, pp. 720-72, 2008.
[43] M. Pohjola, "The adoption and diffusion of ICT across countries: Patterns and determinants," *New Economy Handbook*, pp. 77-100. San Diego, CA: Academic Press.
[44] F. Caselli and W. J. Coleman, "Cross-country technology diffusion: The case of computers," *American Economic Review*, vol. 91, no. 2, pp. 328-335, 2001.
[45] D. J. Pasta. Learning when to be discrete: continuous vs. categorical predictors. *Proceedings of SAS Global Forum.* [Online]. Available: http://support.sas.com/resources/papers/proceedings09/248-2009.pdf
[46] F. Zhao, "An empirical study of cultural dimensions and e-government development: Implications of the findings and strategies," *Behaviour & Information Technology*, vol. 32, no. 3, pp. 294-306, 2013.
[47] G. Olasina and S. Mutula, "The influence of national culture on the performance expectancy of e-parliament adoption," *Behaviour& Information Technology*, vol. 34, no. 5, pp. 492-505, 2015.
[48] R. J. House, P. J. Hanges, M. Javidan, P. W. Dorfman, and V. Gupta, *Culture, Leadership and Organizations: The GLOBE Study of 62 Societies*, 1st ed. Thousand Oaks, CA: Sage Publications, 2004.
[49] L. Gales, "The role of culture in technology management research: National character and cultural distance frameworks," *Journal of Engineering and Technology Management*, vol. 25, no. 1, pp. 3-22, 2008.
[50] P. M. Leonardi, "Indeterminacy and the discourse of inevitability in international technology management," *Academy of Management Review*, vol. 33, no. 4, pp. 975-984, 2008.

Pınar Özbilen was born in İstanbul in 1985, Turkey. Özbilen earned the BS degree on industrial engineering from Yıldız Technical University in 2009, Istanbul Turkey. She recieved the MBA degree in 2014 from Bogazici University, Istanbul, Turkey. Currently, she is a student of management and organization PhD program at Bogazici University, Istanbul, Turkey.

She worked as a research assistant at Yalova University, Department of Management from 2011 to 2012. Since 2012, she has been working as a research assistant at Bogazici University, Department of Management. Her research interests are organizational ambidexterity, organizational change and technology adoption.