

The Moderating Role of Artificial intelligence on Relationship between Leadership, Culture, Psychological Capital and Knowledge Management Effectiveness

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Abstract- This study was an attempt to scrutinize the association of leadership styles (transactional and transformational), organizational culture factors (collaboration, trust and learning), and psychological capital on knowledge management effectiveness (Efficiency, innovativeness and adoptability). The said relationship was also tested with the presence of moderator organization structure. The study was carried out in higher educational institutions of Pakistan. The population of the study was public sector universities situated in Islamabad. The sampling frame consists of faculty members of all public sector universities. Through stratified random sampling, 400 teachers were selected. Data from the respondents were collected through an adapted scale having a Likert-type scale. The validity and reliability of the scale were ensured. A total of 323 responses were received back, with a response rate of 80.75%. The study found that both leadership styles, i.e., transactional and transformational have a positive and significant relationship with KM effectiveness, i.e., Efficiency, innovativeness and adoptability. The study also found that psychological capital has a significant association with KM effectiveness, i.e., Efficiency, innovativeness and adoptability. Furthermore, it was also found that organizational culture factors, i.e., trust, collaboration, and learning, have a positive and substantial relationship with both dimensions of KM effectiveness. The study found that artificial intelligence did not moderate the relationship of leadership styles and KM effectiveness. However, artificial intelligence moderates the relationship between organizational culture factors and KM effectiveness. Keeping in view the results, it is suggested that organizations should strive to achieve KM effectiveness through effective utilization of their leadership styles, psychological capital, and cultural factors. Implications and future directions are also highlighted.

Keywords- KM Effectiveness, Leadership Styles, Psychological Capital, Organizational Cultural Factors, Organization Structure, Artificial Intelligence.

I. INTRODUCTION

The firm's knowledge-based perspective recommends that intellectual resources are the main organizational assets that enable organizations to achieve sustainable competitive advantage (Teece, 2007; Hansen, 2001). Based on that, Schultze and Leidner (2002) argue that the primary resource for an organization to survive for a longer time in today's cutthroat competition is knowledge. In the light of this argument, firms that properly and effectively manage their knowledge resources gain valuable outcomes, i.e., innovation and creativity, effectiveness, customer services, improved corporate efficiency, reduced costs, and workforce (Hansen, 2001). Thus, knowledge management (KM) is a crucial area of interest for organizations and practitioners in today's knowledge-based economy. Although, KM received immense attention from policymakers and management scholars from the last few decades (Schultze and Leidner, 2002; Huber et al., 2001). This shift in the organizational environment occurs due to advancement in technologies, globalization, competition, the everyday changing nature of customer demands, availability of information and knowledge, and an intention to survive for a more extended period (Massey et al., 2002). Researchers and practitioners consider a lot of questions based on KM domain like technical approaches, strategic issues, measuring intellectual capital, knowledge creation, motivating group work, fostering collaboration, and capturing of best practices (Massey and Montoya-Weiss, 2006; Alavi et al., 2005). Knowledge management is a set of continuous and dynamic processes and rules

embedded in all three levels, i.e., individuals, groups, and artificial intelligences. In a particular organization, at any point in time, individuals and groups practice KM processes in different aspects with the help of the organization's internal environment (structure) that supports such activities (Pirkkalainen and Pawlowski, 2014; Pawlowski and Bick, 2012; McInerney, 2002). Thus, KM is the sequence of interrelated activities (Knowledge creation, knowledge transfer, knowledge assimilation, and knowledge application) that, in the end, lead to KM outcomes (Eaves, 2014; Newell et al., 2003). The KM outcomes depend on the individuals or group's intention whether they are actively involved in creating knowledge, storage of knowledge, transfer of knowledge, and application of knowledge towards the organization.

However, in the KM process, a clash may be found between individual efforts and organizational culture that may restrict the whole process of knowledge management (Bedford, 2013). In many organizations, individuals want to learn new knowledge, but they may not be able to do because of the culture of an organization (Elfar et al., 2017). Similarly, in many organizations where the culture of organizations was supportive and encouraged employees to learn new skills and knowledge, an individual employee is not interested in gaining new knowledge. Thus, a clash may occur between personal effort and organizational culture (Pawlowski and Bick, 2012). Ajmal and Koskinen (2008) claim that corporate culture consists of basic patterns and assumptions practiced in the organization. Nguyen and Mohamed (2011) argue that difficulties in KM adoption are due to the psychological climate of an organization, which is due to organizational culture. Furthermore, researchers also say that the failure in knowledge transfer is because of cultural factors instead of technological oversights (Pirkkalainen and Pawlowski, 2013; Ajmal and Koskinen, 2008). That's why organizational culture is considered a primary barricade to the successful implementation of the KM process (Elfar et al., 2017). Although, there are many dimensions of organizational culture (i.e., closed system, job-oriented, learning-oriented, open system, results-oriented, professional-oriented, and controlled cultures) instead of a single dimension (Eaves, 2014; Hofstede, 1990 Fey, and Denison, 2003). However, the KM process accentuates that knowledge is being created, shared with others, and practiced in the organization with the help of social relationships and organizational culture. Therefore, it is essential to know how to make corporate culture supportive that motivates employees to create, store, transfer and practice knowledge in their respective organizations (Ajmal and Koskinen, 2008).

Past researches extol the benefits of knowledge management as it makes organizations able to gain

sustainable competitive advantages. Nowadays, researchers focus on exploring the ways how organization's internal environment facilitate and promote knowledge management practices, how to create a culture where knowledge and skills are shared with fellows by the employees, and how leaders help and motivate their subordinates to engage and practice knowledge sharing behavior (Rafique and Anwar, 2019). Despite random growth in universities and an ever-increasing learning curve, there is still a great void between what organizations learn over a specific period and what they can retain in the form of tacit or explicit knowledge (Hendryadi et al., 2019; Lin and Lo, 2015). Several theories in knowledge management explain industrial level management which rarely applies to the academic context of universities. This proposes to conduct new research in the area to address the problem described above. Thus, the major objective of this study is to fill the research gaps highlighted in the subsequent section.

II. LITERATURE REVIEW

Organizational culture means the underlying beliefs, values, attitudes, and perceptions of organization members that result in a unique social setup and psychological environment. It also includes philosophies, experiences, and expectations, values, and customs of the organizations that guide the behavior and actions of members of an organization (Sulkowski, 2012). It is also the process of creating and constructing the social reality of the organization and individual activities in a group. Organizational culture helps individuals understand the values and norms of the organization and realize and understand the organization's function. Organizational culture also helps members interpret how organizations shape individuals' behavior (Schwartz and Davis, 1981). The performance of any organization largely depends on the values and norms held by members of that organization. When members of the organization exchange cherished values, it develops organizational culture conducive to organizational growth and productivity. The crucial role of organizational culture cannot be denied in creating competitive advantages for the organization (Ogbonna and Haris, 2000). Each organization has its own unique culture, which is composed of both internal elements and external elements.

Different institutions influence an employee who becomes a part of an organization before he becomes part of that organization. These factors may be identified as family, society, personal experience of the individual, and education. These factors shape the behavior, attitudes, and identity of the individual (Rai, 2014). According to Liebowitz (2008), there is an important relationship between organizational culture and national culture, and

companies mirror the organizational culture. The organization's managers and administrators need to avoid variation in organizational culture and make themselves acquainted with local cultures. Managers can also understand local culture by recruiting and employing local people. Such a person is well aware of the local culture, values, and tradition and can quickly adapt management practices in the organization (Warrick, 2017).

It is suggested in different research studies that national culture may not wholly determine the obstacles and limitations of organizational culture. The study of Gerhart and Fang (2005) declares that variation and differences in countries little explain the extent of variation and change in organizational culture and individual culture. It suggests that differences in mean scores are comparatively less with reference to changes and variances within countries. The leader has a vital role in influencing organizational culture. The leader may influence organizational culture through his values, strategies, practices, leadership styles, and setting examples (Steers and Shim, 2013). The way leader behaves and what leader believes pave the way for subordinates to follow them and achieve organizational goals. In this connection, the question arises of whether organizational culture can be managed or not. Different researchers have pointed out that organizational culture can be considered a tool for management, and it can be used to supervise and influence employees (Gehman, Trevino, and Garud, 2013).

We can express artificial intelligence of the business as how the employees execute their duties under the command of their supervisors. The orders of the management provide support in various responsibilities of the workforce. (O'Neill et al., 2001). It is the arrangement by which the administration of the organization categorizes or identifies them by allocating diverse duties (Tran & Tian, 2013). Investigators in near past has determined different kinds of structures for organizations which are helpful in fulfilling their needs and improve their working capacity in given settings. (Conner & Douglas, 2005).

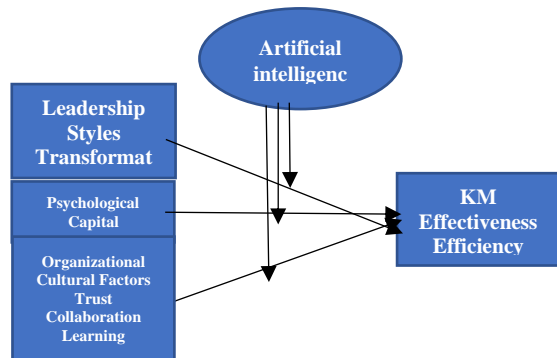
Rainey, Hal. (2003) talked in detail regarding the personnel and effective methods which may be supportive in the development of the business. The artificial intelligence which are open in nature encourages employee's participation and provides a friendly culture for knowledge management practices under concise form of policies. In contrast closed artificial intelligence create barriers for employee's communication (Islam et al., 2010). The Organization structures might be largely categorized in multiple and diverse types, which are the bureaucratic or executive, artificial (Mechanistic) and organic organization structure. Mechanistic

structures have the characteristics of top down hierarchy, formal rules, structured decision making and communication with others in a vertical way. Relatively organic organization patterns have out rightly different features such as flexibility, the enactment of least number of rules favoring devolution consisting of two radically different and diverse constituents i.e. Centralization and formalization. Mechanistic organization structure strongly favors highly centralized and excessive formalization module encouraging and promoting decentralized and less formalization where organic structure promotes highly decentralized and low formalization model (Burns & Stalker, 1961). Any decentralized decision making is known for least authoritarianism and optimum environment for informal milieu obviously coupled with decorum of rules, low strains of bossy structures, where employees feel environment of belongingness which boosts up scope of leadership, culture and psychological capital (Lie & Slocum, 1992., Kanter, 1994). In organic organization structure where decentralization works and the workers enjoy maximum autonomy and there is great outcome in terms of Leadership, Culture, and Psychological Capital. (Morand, 1995). Organic organization structure which work on the principles of horizontally integrated organization structure are normally more pronged to openness and embrace quickly the culture flourishing Psychological Capital and leadership while the mechanistic organization structure that follow vertical integrated patterns show impediments in the path of leadership and psychological (Abouzeedan & Hedner .2012). In the backdrop of the preceding debate, centralization can be taken as "a multidimensional construct, composed of locus of authority and participation" (Duncan, 1976). John and Martin's (1984) definition of centralization is the extent to which marketing planning related activities and decisions are concentrated within a few positions. Centralization if used appropriately can expedite output of any organization in expected and less restrained settings where market demand is constant, monopolization or centralization can be quite useful (Ruekert, Walker & Roering, 1985).

Additionally, the connection between AI and knowledge management is a long-standing one; the first applications were intended to enable the search for experts in the company (Becerra-Fernandez, 2000). Subsequently, other AI-based applications emerged: expert systems, decision support systems, knowledge management systems and recommendation agents. Their implementation in companies supported people in knowledge creation, transfer and application processes, notwithstanding without the autonomy and potential to replace them (Coombs et al., 2020).

Theoretical Model

The following figure shows the theoretical model of the study.



Hypotheses

- Hypothesis 1: Leadership styles have significant effect on knowledge management effectiveness.
- Hypothesis 1a: Transformational leadership style has significant effect on knowledge management effectiveness.
- Hypothesis 1b: Transactional leadership style has significant effect on knowledge management effectiveness.
- Hypothesis 2: Organizational cultural factors have significant effect on knowledge management effectiveness.
- Hypothesis 2a: Trust has significant effect on knowledge management effectiveness.
- Hypothesis 2b: Learning has significant effect on knowledge management effectiveness.
- Hypothesis 2c: Collaboration has significant effect on knowledge management effectiveness.
- Hypothesis 3: Psychological capital has significant effect on knowledge management effectiveness.
- Hypothesis 4: Artificial intelligence has significant moderating role between leadership styles and knowledge management effectiveness.
- Hypothesis 5: Artificial intelligence has significant moderating role between organizational cultural factors and knowledge management effectiveness.
- Hypothesis 6: Artificial intelligence has significant moderating role between psychological capital and knowledge management effectiveness.

III. RESEARCH METHODOLOGY

The technique that the researcher used for the collection of data is stratified random sampling, which is a type of probability sampling. The reason behind choosing this technique is its authenticity and for known population it is better to apply probability sampling. Through this sampling technique, large number of filled questionnaire can easily be collected in a short span of time. For the investigation of the relationship mentioned in theoretical framework, the questionnaires were distributed amongst the faculty from public sector universities. A large group of individuals from whom or elements of the study from where the researcher wants to select the sample based on the study objectives indicating whether the study phenomenon exists in this particular group or not is termed population. The important point is that one may confirm before selecting the target population whether to select this group may enable the researcher to know that the situation, they study is common in this group (Sekaran and Bogie, 2016). Thus, selecting a right population may also affect the overall objectives and hypotheses of the study. The population of the current research is the faculty members of all public sector universities located in Islamabad. There are 14 public sector universities located in Islamabad having a full-time faculty member of 6119 (www.hec.gov.pk). Thus, the target population of the current research is faculty members of these public sector universities operated in the capital of Pakistan.

Table 1: Summary of Hypotheses

Coefficients Statistics

	UnStd. Beta	Std. Error	Std. Beta	t	Sig.
Constant	.441	.126		3.50	.000
TRANS	.162	.036	.184	4.53	.000
TRANSAC	.025	.032	.030	.761	.447
OCFC	.153	.032	.192	4.84	.000
OCFT	.104	.030	.142	3.43	.001
OCFL	.118	.039	.149	3.01	.003
PsyCap	.354	.028	.473	12.52	.000

DV: KM

Depicts regression coefficients of independent variables and KM Effectiveness. The t values of all variables are above +1.96 except TRANSAC having value below the standard value indicating insignificant relation. Similarly, the p values of all variables are below 0.05 confirming at 95% confidence that all variables have positive and significant relations with KM Effectiveness except TRANSAC having a p value of 0.447 that is greater than 0.05 indicating insignificant relationship.

Moderation Analysis

This section highlights the details about moderation analysis. For moderation and mediation analysis there are two main approaches i.e. Hayes and Preacher. This research follows Hayes and Preacher’s (2013) method for moderation analysis with this argument that it is better than Barron and Kenny’s (1986) model. As in Barron and Kenny (1986) model, one may manually calculate the interaction effect value or z score value by multiplying independent variable’s mean score value with moderator’s mean score value and also may not provide bootstrapping option, while in Hayes and Preacher (2013) model the system (PROCESS) itself calculates the interaction effect value and also gives the option of bootstrapping that provides more accurate results.

Relationship of Leadership Style (TRANS) and KM Effectiveness via Moderation Artificial intelligence

Model Summary

R	R ²	MSE	F	df1	df2	p
.88	.77	.16	180.68	3	296	.000

Table highlights moderation analysis model summary of AI on the relationship of TRANS and KME. The value of R in the said table is 0.88 showing the correlation among variables and R² is 0.77 indicating that independent variable and moderator indicate 77% variation in the KME. The value of F-stat is 180.68 indicating the overall model’s fitness which is also confirmed by the p-value i.e. 0.000. Thus, based on the reported results it is concluded that the overall model is fit.

Table Coefficients

	Coeff	se	t	p	LLCI	ULCI
Constant	4.36	.02	156.64	.000	3.88	7.68
AI	.778	.03	25.93	.000	.55	.41
TRANS	-.234	.02	.88	.66	-.05	.05
Int_1	.10	.02	.99	.55	-.06	.08

Table Coefficients

	Coeff	se	t	p	LLCI	ULCI
Constant	9.84	.03	174.21	.001	4.99	9.34
AI	.845	.04	28.21	.000	.28	.54
PC	.541	.01	4.9	.04	.53	.25
Int_1	.214	.01	5.4	.00	.12	.34

Table Coefficients

	Coeff	se	t	p	LLCI	ULCI
Constant	3.24	.05	224.45	.00	5.46	9.12
AI	.554	.01	28.55	.01	.44	.53
OCFT	.894	.04	6.4	.03	.22	.94
Int_1	.56	.03	4.1	.00	.89	.99

The above table shows the moderation results of AI on the relationship of TRANS and KME. As the t-value of AI is 25.93 that is above the standard value of +2 indicating that AI has significant relation with KME. The p-value is also significant i.e. 0.000. The t-value of TRANS is 0.94 which is below the standard value of +2 indicating that TRANS has insignificant relation KME. The p-value also confirms it, i.e. 0.35. The t-value of interaction effect (Int-1) is below the standard value and the p-value is also above 0.05 i.e. 0.74 indicating that the moderator AI did not moderate the relationship of TRANS and KME. Here in this table the decision about whether the moderator moderates the relationship or not depends on the t and p values of interaction effect (Int_1). Furthermore, another criterion to confirm it is that lower level confidence interval (LLCI) and upper level confidence interval (ULCI) do not contain zero. In this case both LLCI and ULCI contain zero confirming that the moderator AI does not moderate the relationship of TRANS and KME.

IV. DISCUSSIONS

The primary aim of this research is to find out the relationship among leadership styles (transformational and transactional), organizational cultural factors (learning, collaboration, trust), psychological capital, artificial intelligence, and knowledge management effectiveness in Pakistan. The objective was to know whether leadership styles, organizational cultural factors, and psychological capital affect knowledge management effectiveness. Another important objective was to know whether artificial intelligence moderates the relationship between independent variables and dependent variables. The population for this research was faculty members of the Higher Educational Institutions (HEIs) located in Islamabad. There are 14 public sector universities operating in Islamabad. These universities have 6119 full-time faculty members. Based on a stratified random sampling technique, a total of 400 faculty members were selected to take part in the study. The researcher visited the respondents personally visit to get their response through a survey questionnaire, which had a 5-point Likert scale. Reliability was checked and found

satisfactory as Cronbach's Alpha value of all such scales is above 0.6. The scale's validity was also tested through exploratory factor analysis (EFA). The results show that the scale used in this research is valid as the KMO and Bartlett's test values are in an acceptable range. Furthermore, the factor loading values of all the items are above 0.5. Besides, descriptive statistics were applied. The value of Skewness and Kurtosis indicates that the data is normally distributed. Correlation, regression, and moderation analysis was performed.

V. LIMITATIONS OF THE STUDY

This study offers a significant scope to explore much more in this area. Future researchers may work on the following aspects: First, this study was conducted only in public sector universities. Private sector universities were not a part of this study. A future study can involve both public and private sector universities. To find any significant deviation in the behavior of employees of both sectors. Second, the current research only selects the universities located in Islamabad. A future study may also select universities from other parts of the country to better generalize the findings and deeply study the relationship. Third, the study selects only two types of leadership, i.e., transformational and transactional leadership, while the complete model of leadership styles of Bass and Avolio (1995) consists of three leadership styles (i.e., laissez-faire, transformational and transactional). It is suggested that future researchers include a laissez-faire leadership style in the existing model to know whether such leadership style impacts KM effectiveness. Fourth, we used PsyCap as a composite variable and check their impact on KM effectiveness. A future study can check the impact of each dimension of PsyCap on KM effectiveness. Lastly, the current research was carried out in Pakistan. Future researchers are encouraged to conduct a similar type of study in other cultures and contexts as well.

VI. CONCLUSION

The current research was an attempt to investigate whether there is any relationship existing among leadership styles (i.e., transformational and transactional), organizational cultural factors (collaboration, learning, and trust), psychological capital, and KM effectiveness dimensions (i.e., adaptability, innovativeness, and efficiency). Furthermore, the moderating effect of artificial intelligence was also checked on the stated relationship. This relationship was tested in public sector universities located in Islamabad. Fourteen public sector universities have 6119 full-time faculty members. Through a stratified random sampling technique, 400 faculty members were

selected to take part in the study. The respondents were aware of the objectives of the study. Four hundred questionnaires were distributed among the respondents, we received only 323 questionnaires. However, 23 responses were found either incorrect or incomplete. These incorrect and incomplete responses were discarded for our study. Three hundred responses were validated for analysis. The scale validity and reliability were duly checked. The basic assumptions of the regression model like autocorrelation, data normality, heteroscedasticity, and multicollinearity were tested. The results show that the data is perfect in all aspects. After that, correlation, regression, and moderation analyses were performed. The study found that both types of leadership styles, namely transformational and transactional, have a positive and significant relationship with the three dimensions of KM effectiveness (innovativeness, adaptability, and efficiency). Thus, the hypotheses H1, H1a, and H1b of the study were accepted. The study also found that organizational cultural factors (collaboration, trust, and learning) significantly related to KM effectiveness dimensions (efficiency, innovativeness, and adoptability) enabled us to say that the H2, H2a, H2b, and H2c were accepted. The research also found that PsyCap has a substantial association with KM effectiveness dimensions (innovativeness, adaptability, and efficiency). Thus, H3 of the current study is also accepted. However, in the case of moderation analysis, we found that artificial intelligence does not moderate the relationship between transformational leadership and KM effectiveness dimensions and between transactional leadership and KM effectiveness dimensions. Based on these results, H4 was rejected. The study found that artificial intelligence moderates the relationship between organizational cultural factors and KM effectiveness and between PsyCap and KM effectiveness. Thus, H5 and H6 of the current research are accepted. Furthermore, in the light of the literature that is available till now, this result could also be a first indication that already-implemented-intelligent robots in firms could be vital for improvisation due to their ability to recombine explicit knowledge available in databases to show response in real time to changes in the environment. If this is taken as true, the result would force to redefine the concept of codification strategy in the digital era, whose focus, unfortunately, falls on using new technologies exclusively to document, store and make knowledge available and accessible to all employees round the clock.

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