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Organisational Innovation Diffusion: the Case of Saudi Arabian Project-based Organisations

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Abstract: This paper aims to provide some unique insights into the verification of organisational innovation diffusion through empirically identifying the major factors determining the level of organisational innovation diffusion. The paper presents a two-stage sequential mixed method analysis: structural equation modelling analysis and regression analysis. A questionnaire survey was administrated to a sample of 223 organisations operating in Saudi Arabia. The results suggest that participative culture and, technology availability and implementation would intensify organisational climate for innovation. The results revealed compelling evidence in support of the moderating role of technology on the relationship between country socio-culture and organisational climate for innovation. Equally important, organisational innovation characteristics could play a crucial role in the intention to adopt a particular innovation. Specifically, maintaining Saudi Arabian top management's status quo is an obstacle to organisational innovation diffusion. This paper expands and improves upon the current understanding of how organisational innovation diffusion, in particular the Project Management Office (PMO), can be accelerated. By focusing on the critical factors within the conceptual model, the paper depicts the crucial role of certain factors that could leverage improved organisational innovation diffusion outcomes.

Keywords: diffusion of innovation, Project Management Office (PMO), Saudi Arabia

I. INTRODUCTION

An innovation is the implementation of a new product, process or a new organisational method in workplace [1]. Due to increasing competition, organisations are forced to introduce new management practices; this consequently has a positive impact on organisations' performance and their innovations [2]. The Project Management Office (PMO) is a new management practice to enhance project management maturity within organisations [3]. Though the PMO is a recent organisational projects phenomenon, it is an organisational innovation in the sense that it encompasses both managerial and operational dimensions. It has a substantial impact on an organisation's performance; thus, it is a key player supporting product and process innovations.

The PMO's contribution encompasses multiple organisational perspectives: it interacts with managerial and operational perspectives and integrates them [4,5]. The primary role of the PMO is to advance integration between projects and mandates, becoming an integrator for both functional and operational areas.

In Addition, business strategy and the actual condition of the business are key contributors to the success or failure of an innovation. The approach undertaken by the business will always affect the diffusion of the innovation [6], Saudi Arabian organisations are lagging in terms of innovation diffusion because of socio-cultural and technological factors [7].

In recent years, the diffusion of innovation has taken a wider perspective by which several characteristics and dimensions influence the diffusion process. Organisational climate plays a critical role in the diffusion.

The organisations' characteristics are essential factors that encourage or discourage the diffusion of innovation [8]. Technology diversification also sustains the diffusion through enhancing knowledge creation and sharing within organisations [9]. Conservative culture and religious groups, coupled with politics and bureaucracy, are the most prevalent factors hindering the adoption of innovation in Saudi Arabia [7].

This paper extends on a recent empirical study conducted by the authors [10] in an effort to provide a regression based analysis which serves as further validation of the key outcome of the prior study: an empirical model depicting relationships between the main organisational innovation diffusion constructs. The paper is organised as follows. In the next section, the previously reported empirical model is briefly introduced and explained. Then, the research methodology undertaken to validate this model is described, followed by the presentation and discussion of the results.

II. MODEL FOR ORGANISATIONAL INNOVATION DIFFUCION

The authors recently conducted an empirical study that focused on the social aspect of organisational innovation diffusion within project-based organisations in Saudi Arabia context [10]. To investigate this issue, a conceptual model incorporating the seven organisational innovation diffusion constructs, namely: Socio-Culture (SOCL), technology for innovation (Tech), organisational climate for innovation (OCI), along with three project management office (PMO) constructs addressing the PMO characteristics: PMO relative advantages (PMORA), PMO compatibility (PMOCT), PMO complexity (PMOCX), and

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outcome-oriented construct addressing the intension to implement project management office (IIPMO), was developed. Exploratory factor analysis (EFA), and structural equation modelling (SEM), were carried out using the data collected from a questionnaire survey of 223 project-based Saudi Arabian organisations.

EFA was initially conducted to uncover the factors representing each construct. SEM was then employed to determine and confirm the factor structure of the model, and to assess the relationships between model constructs. Table1 summarises the model constructs and their associated factors.

TABLE I
MODEL CONSTRUCTS AND ASSOCIATED FACTORS

Construct	Cronbach's Alpha	Factor: Description
Socio-Culture (SOCL)	0.858	SOCL1:Participative Culture SOCL2: Collectivist Culture SOCL3: Hierarchical Culture
Technology (Tech)	0.845	Tech1:Availability and Implementation Tech2:Research and Development
Organisational Climate for Innovation (OCI)	0.870	OCI1:Managerial Support Climate OCI2:Operational Support Climate OCI3:Status-quo
PMO Relative Advantages (PMORA)	0.954	PMORA: Relative Advantages
PMO Compatibility (PMOCT)	0.920	PMOCT: Compatibility
PMO Complexity (PMOCX)	0.915	PMOCX: Relative Disadvantages:
Intention to implement PMO (IIPMO)	0.836	IIPMO: Intention to Implement PMO

According to the model, the SOCL construct had a very positive influence on the Tech construct (0.72, $p < 0.001$). Both SOCL (0.38, $p < 0.001$) and Tech (0.47, $p < 0.001$) were found to positively influence the OCI construct. This pattern of relationships suggests an added relationship between SOCL and Tech constructs that Tech may be an intervening construct, mediating the relationship between the SOCL and OCI constructs. The OCI construct had an equally positive influence on the PMORA (0.48, $p < 0.001$) and PMOCT constructs (0.48, $p < 0.001$), whereas OCI had a negative influence on PMO complexity construct. Finally, both PMORA and PMOCT had nearly equal positive influences on IIPMO: 0.30, $p < 0.001$ and 0.32, $p < 0.001$, respectively. Finally, PMOCX construct was not related to the intention to implement PMO construct (0.07, $p < 0.001$).

III. RELATIONSHIP IDENTIFICATION

Prior to regression analysis, a correlation analysis was conducted to investigate both the existence and strength of the relationships between the constructs of the model, and to unearth the strong and statistically significant relationships. The analysis showed that all seven constructs are associated with another. Pearson correlation *r* (coefficient of correlation) values between the constructs ranged from 0.562 to -0.069. it worth mentioning, that all model constructs have positive association with each other with the exception of the PMO complexity construct which has a negative correlation with the all other six constructs. Pearson's correlation analysis was also performed to identify the strong and statistically significant relationships between the factors within the independent and dependent constructs. Pearson correlation values between the factors ranged from 0.602 to -0.307. Hence, the factors were deemed critical as they represent strongly interrelated set of attributes that underpin the relationships between the factors in the research model. Following the correlation analysis, multiple regression analysis was performed to test the eight paths between the model constructs and its respected factors.

A. TESTING THE INFLUENCE OF SOCL ON OCI

The regression results between SOCL and OCI indicate that the SOCL construct predicted and explained 31.2% of variance of OCI construct with adjusted R^2 values significant at the 0.005 level. The findings suggest the SOCL was positively correlated to OCI, and the association was strong enough to support the statistically significant predicting power of SOCL upon the variance of OCI. The more detailed picture of the relationship between the SOCL and OCI factors was revealed by the findings of the regression analysis at the factor level; the findings revealed that the SOCL factors predict and explain 35.8%, 19.1% and 12.3% of the variance of OCI factors respectively. Additionally, the results of t-values indicate that SOCL1 is a significant predictor of both OCI1 and OCI2, whereas SOCL2 and SOCL3 are significant predictors of OCI3. The above findings suggest that the SOCL construct has a moderate association with organisational OCI construct and factors. Nevertheless, the SOCL construct and its factors have statistically significant predicting power over the OCI construct and its factors, ranging from 10% to 40%, moderately significant at the 0.005 level.

B. TESTING THE INFLUENCE OF TECH ON OCI

The regression analysis revealed that Tech predicted and explained 24.1% of variance of OCI with adjusted R^2 values significant at the 0.005 level. The findings suggest that Tech was positively correlated to OCI, and the association was strong enough to support the statistically significant predicting power of Tech upon the variance of OCI. A more detailed picture of the relationship between the Tech and OCI factors was revealed by the findings of the regression analysis at the factor level. The findings revealed that the Tech factors predict and explain 31.0%, 21.8% and 3.9% of the variance of OCI factors (OCI1, OCI2, and OCI3), respectively. Additionally, the results of t-values indicate that Tech1 is a significant predictor of all OCI factors (OCI1, OCI2 and OCI3), whereas Tech2 is a

significant predictor of only OCI1 and OCI2 factors. There was no statistically significant predicting power found with OCI3. The above findings suggest that the Tech construct has a moderate association with organisational climate for innovation (OCI construct and factors). Nevertheless, the Tech construct and its factors have statistically significant predicting power over the OCI construct and its factors, ranging from 20% to 30%, moderately significant at the 0.005 level.

C. TESTING THE INFLUENCE OF OCI ON PMO

The regression analysis revealed that the OCI predicted and explained 9.9%, 13.7% and 10.1% of variance of PMORA, PMOCT and PMOCX respectively, with adjusted R^2 values significant at the 0.005 level. The findings suggest the OCI was positively correlated to PMORA and PMOCT, and negatively correlated to PMOCX. The association was strong enough to support the statistically significant predicting power of OCI upon the variance of PMO constructs. A more detailed picture of the relationship between the OCI and PMO constructs was revealed by the findings of the regression analyses at the factor level; analysis revealed that the OCI factors (OCI1, OCI2 and OCI3) predict and explain 16.8%, 18.0% and 11.8% of the variance of PMORA, PMOCT and PMOCX respectively. Additionally, the results of t-values indicate the OCI1 factor is a significant predictor of PMORA and PMOCT, while OCI3 is a significant predictor of PMOCX. The above findings suggest that the OCI construct has a moderate association with the PMO constructs. Nevertheless, the OCI construct and its factors have statistically significant predicting power over PMO constructs, ranging from 10% to 20%, marginally significant at the 0.005 level.

D. TESTING THE INFLUENCE OF PMO ON IIPMO

The regression analysis revealed that the PMORA construct predicted and explained 13.9% of variance of IIPMO, and PMOCT construct predicted and explained 12.4% of variance of IIPMO. PMOCX construct predicted and explained zero variance of IIPMO. The findings suggest that two PMO constructs (PMORA and PMOCT) were positively correlated to IIPMO, and the association was strong enough to support the statistically significant predicting power of PMORA and PMOCT upon the variance of IIPMO. However, for PMOCX no statistically significant predicting power was found over IIPMO. Additionally, the results of t-values, indicate that PMORA and PMOCT had significant predictive power over IIPMO, while in Table 14 the result of t-value revealed that PMOCX had no predicting power over IIPMO. The above findings suggest that the predicting levels of PMORA and PMOCT were around 10%, marginally significant at 0.005, while the predicting level of PMOCX was about zero.

E. TESTING THE INFLUENCE OF SOCL ON TECH

The regression analysis revealed that the SOCL construct predicted and explained 24.1% of variance of Tech construct with adjusted R^2 values significant at the 0.005 level. The findings suggest the SOCL was positively correlated to Tech, and the association was strong enough to support the statistically significant predicting power of SOCL upon the variance of Tech. A more detailed relationship between the SOCL and Tech factors was revealed by the findings of the regression analyses at the factor level. The findings revealed that the SOCL factors (SOCL, SOCL2 and SOCL3) predict and explain 23.1% and 22.2% of the variance of the Tech factors (Tech1 and Tech2), respectively. Additionally, the results of the t-values indicate that SOCL1 and SOCL2 are significant predictors of both Tech1 and Tech2, whereas SOCL3 is a non-significant predictor of the Tech factors. The above findings suggest that the socio-culture construct has a moderate association with technology (Tech construct and factors). Nevertheless, the SOCL construct and its factors (SOCL1, SOCL2 and SOCL3) have statistically significant predicting power over the Tech construct and its factors, at above 20%, moderately significant at the 0.005 level.

Therefore, hierarchical regression analysis with technology as the dependent variable was performed. Hence the changes in R^2 and the F statistic are examined. Throughout the analyses, attention was paid to the standardised coefficient values to see if the F statistic for that hierarchical step was significant.

The interaction terms of Tech1 (technology availability and implementation) were significant, indicated by the significant increase in the R^2 values when interaction terms were included. However, Tech2 (technology research and development) did not moderate the relationship between socio-culture and organisational climate for innovation. Therefore, the SEM analysis was supported.

IV. DISCUSSION

Among the socio-culture factors, participative culture appears to be key in the relationship between socio-culture and technology. It has an active predicting power upon the variance of both factors of the technology construct (technology availability and implementation, and research and development). Collectivist culture has an active but limited predicting power upon the variance of technology availability and implementation factor. Interestingly, participative culture has equally important values for both the technology and organisational climate for innovation constructs. Participative culture has an active predicting power only upon the variance of managerial support climate and operational support climate factors. In addition, the factors of collectivist culture and hierarchical culture have an active but limited predicting power upon the variance of status quo.

Collectivist culture and hierarchical culture maintain the status quo of top/senior management. Collectivist culture has a positive impact on team creation, which stresses the priority of group goals over individual goals and the importance of cohesion within social groups.

However, hierarchical culture has a negative effect on the treatment of others, and innovation needs motivated employees to share their opinions and ideas freely and comfortably. They need to be equal in hierarchy so ideas can also be equal and come from any employee without prior permission. Prior studies in Saudi Arabia have identified some barriers to employees' creativity. First, task completion is the priority of Saudi managers; there is less creativity. There is no room for flexibility, constructive criticism or public evaluation. Another barrier is the decision mechanism. Decisions are made independently and without consulting subordinates, and are not delegated to a lower level in the hierarchy [11,12].

Creativity is encouraged by organisations that utilise a participative management style, employee engagement in decision-making, effective communication channels, supportive risks and democratic practice [13]. Motivation by participation is a principal technique. The more employees participate, the more their ideas can emerge. The result would be more confident employees and a more open work environment. Unfortunately, management style in Saudi Arabia is a blend of collectivistic and hierarchical culture that hinders creativity.

Prior research on Saudi online participation stressed technology's role in enhancing Saudi society's participation in exchanging ideas. It also alleviates the effects of Saudi conservatism. The result of online participation could benefit society members. It would create a new collectivist culture that is not under guardianship, lessening the power of the country's traditional system and upsetting the executives' privileges [14]. Technology is seen by authorities as a source of disrupting the current system and status, hence their resistance to the change [15].

For the technology construct, technology factors (technology availability and implementation, and research and development) have an active predicting power upon the variance of organisational climate for innovation factors (managerial support climate and operational support climate). They have less predicting power upon the variance of status quo factors. It can be reasonably deduced that technology's usage brings changes into organisations, which conflicts with management's culture values. It then becomes difficult to accept because it may threaten top hierarchy status [16]. Additionally, it is suggested that an organisation's use of technology raises an innovation's intensity [17].

The predicting power of participative culture upon the variance of technology and organisational climate for innovation factors, and the predicting power of technology factors upon managerial and operational support climates, confirms the moderating effect of technology on the relationship between socio-culture and organisational climate for innovation. Sophisticated systems allow efficient information transfer between organisation members. This enables a more effective work environment that is conducive to knowledge-sharing, and improves communication within the whole organisation and projects alike. It also enables employees to overcome a restrictive culture and improve the work environment, increasing the level of their participation. Online participation among Saudis improves individual attributes such as critical thinking and intellectual discussion [14]. Arab leaders, including Saudis, view technology as a threat to their current position [18]. This is an obstacle for the optimal utilisation of technology within Arab countries, and Saudi Arabia is no exception.

In the organisational climate for innovation construct, managerial support climate has an active predicting power only upon the variance of PMO relative advantages and PMO compatibility. The status quo factor has an active but limited predicting power upon the variance of PMO complexity. It appears that the operational support climate factor is passive and has no predicting power upon the variances of innovation characteristics and the PMO in particular. There have been underlying assumptions about the influence of creating the PMO on the perception of managerial power loss, even if managers understand its benefits. The PMO hands over some top management control to a centralised entity and inevitably faces resistance. This can lead to lack of project effectiveness; consequently, PMO adoption is at risk [20].

The findings provide an insight into management decision mechanisms to adopt or reject an innovation. Saudi Arabian organisations' decisions on innovation are purely management-based and have no relation to operations. Operational activities may not be the impetus to adopt an innovation. Several explanations may be posited for this finding. First, organisation decisions are made in isolation from the operational environment; in other words, making a decision is not a two-way process between management and the other members. This could be a result of the country's hierarchical culture with limited participation. The lack of communication channels between an organisation's levels is a barrier against creativity in Saudi Arabia [11].

Second, organisational innovations would affect the management environment only, which gives top management the sole right to decide whether to accept them. Under such conditions, a gap is more likely to exist between the managerial and operational environments within Saudi Arabian organisations, reducing the implementation of innovations. Furthermore, top management do not consider the operational environment an important element of the decision-making process. Only top management can decide the relative advantages or compatibility of a particular innovation despite its operational benefits. It seems that maintaining the status quo is a priority in the decision-making process in Saudi Arabia.

These findings clearly indicate that status quo is a much more effective type of organisation climate, particularly in Saudi Arabia. Local executives and top management do not welcome changes because they may threaten their current situation. Hence, before implementing any changes to the work environment, an organisational innovation's advantages and compatibility should work in conjunction with the current decision-

makers' status quo, and not contradict it. Changes may also be manipulated to conform to the status quo; therefore, the eventual change will be under control. In addition, in order for top management to preserve their status quo, then it becomes desirable to complicate the new system. This is reflected by the predicting power of the status quo factor upon the variance of PMO complexity: PMO complexity has a negative and statistically significant correlation with the status quo factor, and a passive predicting power upon the variance of the intention to implement the PMO. Therefore, the more complex and ambiguous the new system, the more the status quo is maintained. Top management becomes the source of problem-solving and conflict resolution. This approach may justify the lack of effective concern over the innovation's cost. In sum, status quo has been perceived as a source of power.

From the above discussion, status quo is a key factor in the decision to adopt innovations within Saudi Arabian organisations. Among the conceptual framework factors, status quo is associated, and has a statistically significant correlation, with five factors, namely: 1) hierarchical culture, 2) collectivist culture, 3) managerial support climate; 4) operational support climate; and 5) PMO complexity. These relationships represent the status quo in its profound format. First, a hierarchical culture supports the status quo, with the assistance of collectivist culture, allowing it to hang over the entire group, team, organisation, or even the whole country. Second, status quo has a positive and statistically significant correlation with managerial and operational support climate factors within the organisational climate for innovation. All three factors support each other within the same construct. Third, PMO complexity has a negative and statistically significant correlation with status quo, in which complexity of a new system or practice is another incentive to maintain the status quo.

V. CONCLUDING REMARKES

The understanding of organisational external factors does not necessarily lead to high levels of innovativeness, unless it is backed up by an appropriate organisational climate. The results of this study indicate that the work environment is important for innovation. Therefore, a combination of supportive managerial and operational climates would harness and transform creative ideas into innovative practices. Top management should consult with employees at various levels and functions in the organisation. Two-way communication is crucial because management by consultation is essential for sharing ideas, decisions, risks, and rewards. There must be a radical shift in Saudi Arabian organisations' perspective, from controlling people to creating conditions where employees can seek direct expression and self-fulfilment, without unnecessary control and conformity. Organisations that are steeped in innovative behaviour would have less resistance to change. In sum, the utilisation of technology and organisational climate for innovation could alleviate the stifling effect of Saudi Arabia's conservative culture and so erode the hierarchical status quo.

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