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Structural Mediation Model of Information System and Sustainable Performance of UAE Manufacturing Sector

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Abstract: This study intends to find out the mediating effect of organisational culture on the relationship between information system and sustainable performance of manufacturing sector in UAE. This study used AMOS-SEM software to develop mediation model that linking the mediating relationships between Information System, Organisational Culture and Sustainable operation Performance. Data was collected through questionnaire survey among the operation staff of Abu Dhabi manufacturing companies. A total 250 questionnaires were distributed however 205 were returned and only 200 are valid which indicates a response rate of 80%. The analysis found that TPS has positive but not significant effect to SP; OIS has positive but not significant effect to SP; FMW has a positive and significant effect on SP; SDS has a negative and not significant effect to SP and SP has positive but not significant effect OC. For the path relationship between the four exogenous variables (TPS, OIS, SDS, and FMW) and the mediator variable (OC), the results are TPS has positive and significant effect to OC; OIS has positive but not significant effect to OC; FMW has positive and significant effect to OC and SDS has positive and not significant effect to OC. Collectively, the five exogenous constructs (TPS, OIS, SDS, FMW and OC) explained 89% variation in operational performance and 86% of the variation in organisational culture. However, for a mediator, it was found that OC has no significant mediating effect on the relationship between TPS and SP; OC has no significant mediating effect on the relationship between OIS and SP; OC has no significant mediating effect on the relationship between SDS and SP and OC has no significant mediating effect on the relationship between FMW and SP. it can be concluded that there is a positive relationship between information system dimensions and operational performance. However organizational culture has no contributing any mediating effect to the relationship. These findings have contributed to the body of knowledge and could be shared among the UAE manufacturing practitioners

Keywords: Organisational Culture, Sustainability Performance, Information System, UAE

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1. Introduction

The manufacturing industry plays a very vital role in the economic growth and development of many countries including UAE. One of the important performance criteria in manufacturing is sustainable operation performance (SP) which relates to the utilization of all resources (people/assets/time) to deliver lower cost and higher quality products, services to the customers in the shortest time possible. The sustainable performance depends on information system (IS) in many ways, such as through industrial technology applications or/and through its multiple administrative applications such as measuring the return on investment (ROI) and return on assets (ROA), relative profitability, economic input and outputs, total revenue and others. The literature review indicates that there is no much researches on the role of information system plays on operational performance and also its roles to lead to operational performance in the UAE manufacturing industry. Hence, this study intends to find out the mediating effect of organisational culture on the relationship between information system and sustainable performance of manufacturing Companies in UAE.

1. Literature Review

1.1 Information System

According to (Davis, 2000), information systems comprise of the information technology infrastructures, application systems, and staff that use information technology to dispense information and communication services for transaction handling, operations, administration and management of firms. To (Jerbi *et al.* 2007) infrastructure of an information system contains system applications, data, servers and the network. (Jerbi *et al.* 2007) maintained that information system resources are a mixture of features consisting of a firm's knowledge and capability, internal and external relationship between the ICT elements with business divisions and external stakeholders, technical skills and infrastructure. (Davis, 2000) upheld that information technology systems and applications for transactions and operations are what make an information system, which supports administrative and management functions, organisational communication and coordination, and is essential for adding value to products and services. In this study the information system considered are the four dimensions of information system in the manufacturing sector which are Transaction Processing System [TPS], Operation Information System [OIS], Decision Support System [DSS] and Financial Manager's Workbench [FMW].

1.2 Sustainable Performance

Sustainability focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs. The concept of sustainability is composed of three pillars: economic, environmental, and social [also known as profits, planet, and people]. According to (Fricker, 2001), sustainability is about ecological integrity, quality of life and transformation transcendence. Our emphasis on the physical, the objective and the rational of the external manifestations of sustainability only. The internal manifestations of sustainability which are the non-material, the subjective and the experiential are put to one side since it is disorganised, interpretive and time-consuming. (Bell and Morse, 2010) argue that measuring sustainability is an ineffective exercise of measuring the immeasurable elements. Hence, sustainability should be defined by the parameters that can be measured. The approach and efforts to quantify sustainability do not seem to work or worse still, end up measuring things that can be measured and not things that should be measured because an element of circularity appears inevitable.

Sustainable performance is about management of performance by helping individuals and teams to achieve their potential and recognize their role in contributing to the goals of the organization (Székely & Knirsch, 2005). (Wright, 2003) has pointed out that individuals are more committed if they believe the objectives are achievable and will resulted in important outcomes for themselves or the organization. (Kaplan & Norton, 1996) defined it as the process of managing the execution of an organization's strategy through plan that translated into results. (Armstrong, 2009) mentioned performance management is a continuous process that reflects normal good management practices of setting direction, monitoring and measuring performance and taking action accordingly. Performance management should be treated as a natural function that all good managers carry out. (Ndung'u, 2009) said that performance management aligns with individual and organizational objectives. While (Chhabra, 2018) defined performance management as a systematic process for improving organizational performance by developing the performance of the individuals and teams.

1.3 Organisational Culture

Strong culture in the organization is very helpful to enhance the performance of the employees that leads to the goal achievement and increase the overall performance of the organization. According to the (Stewart, 2010), norms and values of organizational culture highly effect on those who are directly or indirectly involved with the organization. These norms are invisible but have a great impact on the performance of employees and profitability. A strong organizational culture supports adaptation and develops organization's employee performance by motivating employees toward a shared goal and objective; and finally shaping and channelling employees' behaviour to that specific direction should be at the top of operational and functional strategies. Shared value of employees is one of the basic components of organizational culture. And also clarifies that shared value which is a set of social norms that

define the rules or framework for social interaction and communication behaviours of organisation's members (Choi *et al.*, 2018). It is clear now that, organizational culture has influence on sustainable performance of manufacturing Companies in UAE.

1.4 Conceptual model

This study intended to develop and assess mediation relationship which comprises of three major constructs namely *information system dimensions*, sustainable performance and *organizational culture* of the UAE manufacturing industry as Figure 1.

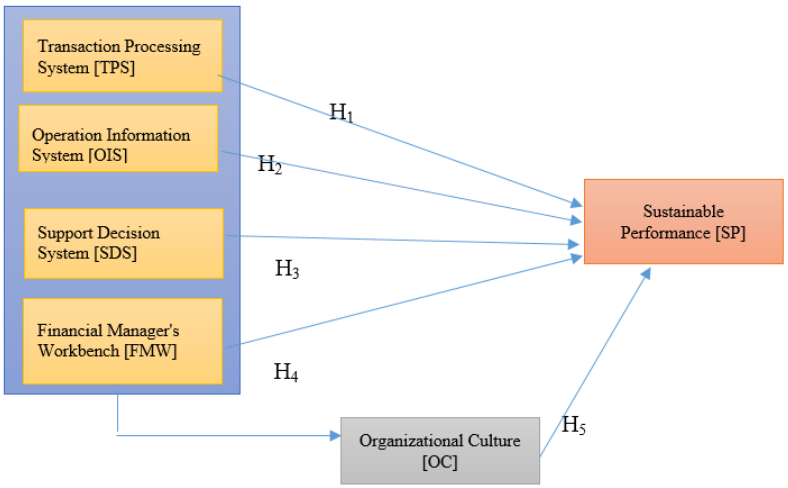

Fig 1 - Conceptual framework model

The mediation model as Figure 1 which comprises of independent/exogenous construct which is *information system dimensions* that consisted of four dimensions namely *Transaction Processing System* [TPS], *Operation Information System* [OIS], *Support Decision System* [SDS] and *Financial Manager's Workbench* [FMW]. The dependents/endogenous construct which is *Sustainable Performance* [SP] while the mediating construct which is the *Organizational Culture* [OC] in the environment of the UAE manufacturing industry.

2. Methodology

This research aimed at investigating the role of Information System on the Sustainable Performance of Manufacturing Companies in the UAE. The study adopted a quantitative approach where the data was collected by administering questionnaires among the operation staff of Abu Dhabi manufacturing companies and analysed using SPSS and AMOS software. This study has distributed 250 questionnaires among operations staff of manufacturing industries in the United Arab Emirates (UAE). However, 205 of the questionnaires was returned and only 200 are valid which indicates a response rate of 80%. The collected data was used to develop the mediation model which comprises of four information system dimensions act as exogenous constructs and sustainable performance acts as endogenous construct and organizational culture act as mediator to the relationship.

3. Modelling Analysis

Using the AMOS graphics, the structural relationship between the constructs in the research framework model was evaluated. The initial output of the structural model shown that while other fitness indexes were achieved, however, some indexes failed to meet the acceptable level. For example, all the observed factor loadings and their corresponding square multiple regression meet the required thresholds of 0.50 and 0.30 respectively. In respect of the fit indexes, the RMSEA and p-value satisfied the criteria for acceptance while the CFI, GFI and other measures reported values below the acceptable thresholds. This suggests that model re-specifications were required.

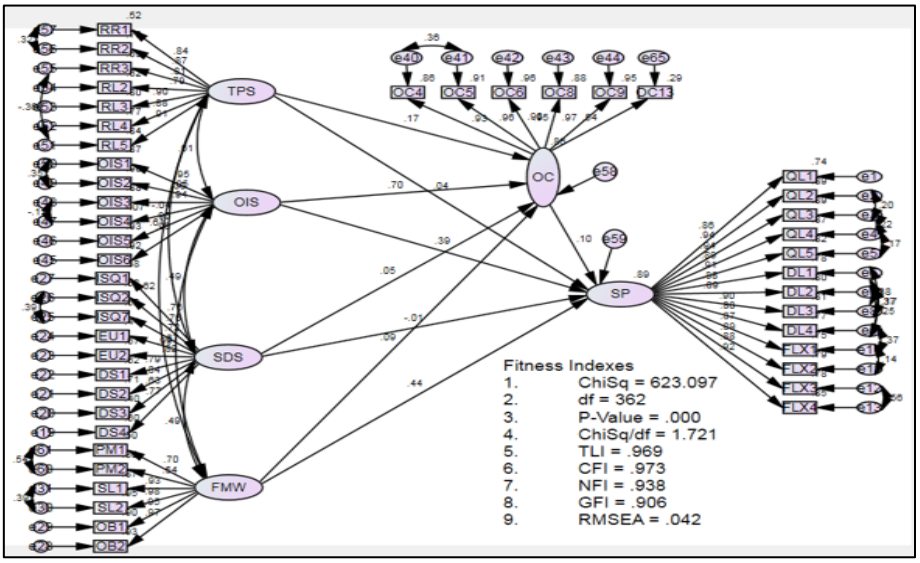

Fig. 2 - Final structural model of the research constructs

The final structural model as shown in the figure 2 indicates that the model satisfied all the requirements for model acceptance. The standardized regression weights squared multiple regression, and all the goodness-of-fit indexes meet the recommended thresholds. The structural model was arrived at after an iterative process of model re-specification. It shows the causal effect of the mediating (OC) on the endogenous construct (SP).

3.1 Direct relationship

Given that the finalised structural model of sustainable performance of manufacturing companies in UAE as figure 1, the direct relationship between *information system* (IS) and the *sustainable performance* of manufacturing shows a good fit to the data. Inferences can be made from the model, providing empirical support for three research hypotheses as follows:

- There is a positive relationship between *Transaction Process System* (TPS) and *Organisational Culture* (OC) ($\beta = .040$, $z = 2.809$, $p = 0.005 < 0.001$, $r^2 = 0.86$).
- There is a negative relationship between *Operation Information system* (OIS) and *Organisational Culture* ($\beta = .049$, $z = 14.768$, $p = 0.000 < 0.10$, $r^2 = 0.86$).
- There is a positive relationship between *Support Decision System* (SDS) and *Organisational Culture* ($\beta = 0.054$, $z = 1.409$, $p = .159 < 0.05$, $r^2 = 0.86$).
- There is a positive relationship between *Financial Management Workbench* (FMW) and *Organisational Culture* ($\beta = 0.510$, $z = 3.170$, $p = 0.002 < 0.01$, $r^2 = 0.86$).

For the direct relationship, it can be concluded that only two out of four information system dimension which are *Transaction Process System* positive and *Financial Management Workbench* are having positive and significant relationship with *Organisational Culture.*

3.2 Indirect Relationship (mediating effect)

The mediating effect of Organisational Culture on the relationship between the four exogenous (independent) variables and the endogenous (dependent), the bootstrapping method is used. The bootstrapping method is described as the most effective method of testing mediation than the Sobel Test method [9]. The procedure involved re-sampling of the working data set between 500 and 1000 times which a sampling distribution from which the total effect, the direct effect and indirect effect estimates, and their corresponding 95% confidence interval values are produced. The algorithm also estimates the lower and upper limits as well as the two-tailed significant values for the effects. The bootstrapping results for testing the mediation effect of OC are as Table 1.

Table 1 - Two-tailed significance of bootstrap confidence interval for indirect effect

Path relationship	Estimate [β values]	CI		P-value
		Lower Bounds	Upper Bounds	
SP ←OC←TSP	.017	-.002	.000	.067
SP ← OC←OIS	.071	.000	.104	.310
BSP← OC←SDS	.005	-.022	.050	.413
BSP← OC←FMW	.009	-.017	.000	.091

Table 1 shows that *OC* does not mediate on the relationship between *TSP and SP* (β= .017; 95% CI: -.002~.000; p=.067). Similarly, *OC* have no mediation effect on the relationship between *OIS* and *SP* (β= .071; 95% CI: -.000~.104; p=.310). Also *OC* does not mediate on the relationship between *SDS and SP* (β= .005; 95% CI: -.022~.050; p=.413).

Furthermore, the relationship between *FMW* and *SP* is not mediated by *OC* as indicated by the result (β= .009; 95% CI: -.017~.000; p=.091). In summary, *organizational culture* is statistically insignificant mediation effect on the relationship between the four independent variables and the dependent variable in the research. Even though, the overall goodness-of-fit indices of the model provide statistical evidence of the robustness and generalizability of the model.

4. Conclusions

In conclusion, this study has addressed the mediating effect of *organisational culture* on the relationship between *information system* and *sustainable performance* of manufacturing companies in UAE. This is done by formulating, examining and establishing a research model linking the mediating relationships between *Information System*, *Organisational Culture* and *Sustainable Performance* experienced by the employees. The findings of the modelling for the direct relationship, only two out of four information system dimension which are Transaction Process System positive and Financial Management Workbench are having positive and significant relationship with Organisational Culture. For indirect relationship (mediating effect), *organizational culture* is statistically insignificant mediation relationship between the four independent variables and the dependent variable of the model. Even though, the overall goodness-of-fit indices of the model provide statistical evidence of the robustness and generalizability of the model. The results from this study contributes to body of knowledge and the community of manufacturing of UAE.

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