Open Innovation and Organizational Performance: An Applied Study in Independent Institutions in Jordan
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Open Innovation and Organizational Performance: An Applied Study in Independent Institutions in Jordan

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The aim of this paper is to investigate how open innovation influences firm performance in the public sector, by testing that in 25 public independent institutions in Jordan via structural equation modeling. . Data was gathered through a questionnaire given to 392 employees in the top management (upper, middle, and heads of departments) in the study population using a simple random probability sample. This was done after testing it through a quantitative exploratory study conducted on 40 members of the study population. The sample was tested via cross-sectional data. The results indicate that open innovation has a positive impact in both its inbound and outbound dimensions on organizational performance.

keywords: Open innovation, firm performance, inbound innovation, outbound innovation.

1 Introduction

The term open innovation was originally defined by Chesbrough (2003) to emphasize the importance of leveraging external resources to stimulate internal growth within a company leveraging targeted inflows and outflows of knowledge to accelerate internal innovation or expansion External use of innovation markets. If companies want to advance technology, they can and should use external ideas as well as internal ideas. Chesbrough and Bogers (2014) has developed the concept of innovation as a distributed innovation

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process based on purposefully managed knowledge flows across organizational boundaries using financial and non-financial mechanisms in line with the business model, and It is no longer necessary to conduct research in-house to create value; instead, companies should focus on business models that best exploit and capitalize on market innovations.

Gassmann and Enkel (2004) recognized three key Open Innovation processes based on their own empirical database of 124 companies: (1) the outside-in process, where buyers, suppliers, and external knowledge can influence a company's innovation; (2)) an inside-out process, in which a company sells ideas, knowledge, and technology to outside the company; (3) a coupling process, which represents the connection between outside-in and inside-out processes, in which the firm both provides information and takes information.

According to Chesbrough (2003) Inbound OI activities enable businesses to obtain new concepts, ideas, and technological advancements from outside their own walls. which includes customer involvement, external networking, external participation, outsourcing R&D. (Van de Vrande et al. (2009)).

Out-bound OI relates to the exploitation of knowledge in a variety of ways, By revealing internal knowledge via out-bound OI innovation finds its way towards commercialization , And Licensing-out enables an external partner to use the firm's internal knowledge and create a new market (Mortara et al. (2011)).

While Enkel et al. (2009) proposed a coupled process that combines both in- and out-bound knowledge flows for the focal firm, the primary goal would be acquiring the knowledge required to generate new value for its own objectives, even though there is an out-bound flow of knowledge for the benefit of another firm.

Open innovation is a distributed innovation process that relies on purposefully managed knowledge flows across organizational boundaries. These knowledge flows are called inbound innovation and out bound innovation so that the organization exchanges resources with its external environment; Inbound open innovation provides companies with important ideas and knowledge that contribute to supporting their assets to achieve commercial success. Outbound open innovation also allows knowledge and technology to be marketed or shared with another organization, thus reducing the pressure on companies' research and development costs and increasing the success rate of their performance. (Li et al. (2020))

Lazzarotti et al. (2017) confirmed that when companies follow the open innovation approach, they use their external resources to focus on developing their core competencies or accessing new competencies faster than companies that rely on their internal resources only. Market turbulence requires companies to constantly strive to obtain on new knowledge and technologies to meet new customer requirements and preferences, and previous studies have shown that the openness strategy is the most appropriate in a business environment characterized by globalization, intense competition, market turbulence, and technology (Gassmann (2006)).

Mazzola et al. (2012) investigated the impact of OI modes on financial and innovation performance and discovered that the OI effect can be both positive and negative. Brunswicker and Vanhaverbeke (2015) revealed that not all OI modes are always helpful in boosting innovation performance. The study conducted by Hung and Chou (2013)

examined the impact of external technology acquisition (in-bound OI) and external technology exploitation (out-bound OI), The results indicated that only in-bound OI had a beneficial effect on performance..

Many businesses (GE, Samsung, Lego, NASA) have abandoned their closed business models and begun working with other stakeholders to achieve goals like new goods, improved performance, or more sustainable company. In this spirit, researchers are encouraged to collaborate with practitioners to explore (Jian Chung Yuan et al. (2009)).

Bogers et al. (2019) showed in his study that companies that are considering adopting an open innovation strategy must be able to deal with the disadvantages of potential knowledge leakage and avoid losing their competitive advantage. They must also have sufficient flexibility and speed to respond to available opportunities and modify their strategy accordingly. They must also increase their absorptive capacity for external knowledge and integrate it with their internal knowledge to achieve the highest benefit.

The link between Intellectual Property protection and OI is characterized by a paradox (Brem et al. (2017)). Companies should consider protection before sharing knowledge with partners. However, protecting an idea can be expensive and time-consuming Companies must be able to deal intelligently with the risks resulting from openness towards new knowledge or technology and consider their costs so that they exploit the technologies and protect themselves from potential threats.

There is still a scruple to implement an open innovation strategy in many companies due to a set of barriers such as organizational culture, lack of internal commitment and employee resistance (Bigliardi et al. (2020)). These barriers are more severe in small and medium enterprises (Van de Vrande et al. (2009)). Recent research indicates that open communication, decentralization, and functional autonomy are key factors in promoting innovation (Prakash and Gupta (2008)).

Even with its significance, there is still scarcity of applied research examining the distinct impact of open innovation on organizational performance. This study explores the effect of open innovation, both inbound and outbound on the organizational performance, as shown in Figure 1.
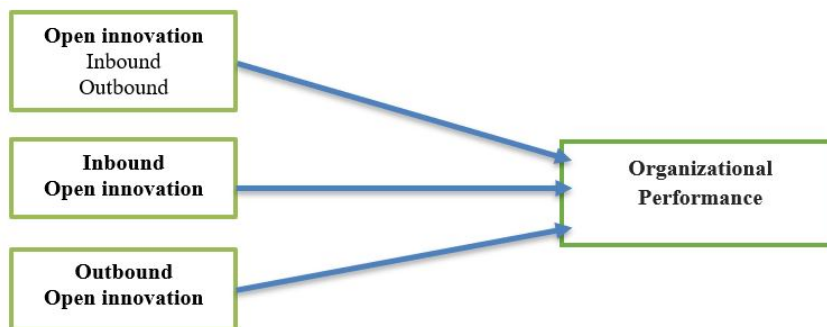

Figure 1: The proposed Model

There are two research contributions made by this work. Initially, we investigate

the direct correlation between open innovation and the performance of organizations. The second area of investigation in this study is the impact of both outbound and inbound open innovation on enhancing organizational performance in public Jordanian independent enterprises.

The remainder of this article consists of four sections. We first introduce the theoretical background and develop hypotheses regarding the relationship between OI and firm performance. We then describe the data and methods in Section 2 and present the results in Section 3. Section 4 presents a discussion and the paper concludes with implications and possible research limitations.

2 Literature Review

The role of open innovation on organizational performance:

In many innovative companies, open innovation (OI) is perceived as a paradigm shift where innovation is created through internal as well as external knowledge integration and access (Reed et al. (2012)) . In order to accelerate internal innovation, extend the market, and generate innovation external to other organizations, effective open innovation requires both inbound and outbound quality innovation resources from outside the firm (Laursen and Salter (2006)).

It's unclear how open innovation affects performance, according to earlier research. While some research highlighted the possibility of a negative association, several concluded that open innovation had beneficial benefits on business performance (Rumanti et al. (2021)). Several studies have found that there are positive effects of open innovation on company performance while several other studies discuss the inverse U-shaped relationship or even negative effects (Caputo et al. (2016)) (Grceo et al,2015). According to (Wassmer et al. (2017)), internal research and development and external collaboration go hand in hand to boost performance.

Spithoven et al. (2013) & Popa et al. (2017) came to the conclusion that open innovation, both inbound and outbound, benefits small and medium-sized businesses more than large businesses because it is less bureaucratic and more responsive to market demands due to its flexibility. Small and medium-sized businesses can benefit from the knowledge and technology generated by other businesses through open innovation techniques, which solves the issue of resource and competency scarcity. (Crema et al. (2014))

As for (Hwang et al. (2023)), he concluded that the levels of open innovation used by the organization should be moderate, as excessive reliance and cooperation with external partners may lead it to loss. (Bigliardi et al. (2020)) also found that many companies are reluctant to implement open innovation practices, as the organization's culture, lack of internal commitment, and employee resistance have a significant impact on the adoption of its activities and create a potential barrier to achieving them.

We note that the results of previous studies on the role of open innovation in performance have fluctuated between the positive role that open innovation plays in raising organizational performance and the danger of organizations applying this strategy due to its high costs, unguaranteed results, and the possibility of the emergence of internal

barriers that affect the achievement of these practices. These complex findings have made it more difficult for us to grasp how OI affects performance , But the complexity stems from OI's diversified nature, which poses decision-making challenges (Dahlander and Gann (2010)). Firms must select the best option or choices from a range of options, and this is especially crucial for SMEs. It is difficult for SMEs to use multiple innovative channels at once due to resource restrictions (Vanhaverbeke et al. (2012)).

Because some previous studies showed that open innovation practices are useful for small and medium enterprises. We expect them to be beneficial for independent enterprises in Jordan (the study population) due to their nature being similar, provided that the enterprises are able to modify their strategy in line with the changes required by the application of these practices. In this context, the main first hypothesis can be formulated as follows:

H1: There is a statistically significant effect of open innovation on organizational performance.

The role of inbound open innovation on performance:

Numerous empirical investigations have demonstrated the distinct impact of inbound open innovation on innovative performance. The research of (Hamaok,2008;Hung and Chou (2013)) corroborated the findings of (Faems et al. (2008); Laursen and Salter (2006); Du et al. (2014)) regarding the beneficial effects of inbound open innovation on performance. Reed et al. (2012) demonstrate that inbound open innovation and business profitability are positively correlated.

On the other hand, some studies have shown that there is no effect of inbound open innovation on organization performance, Or has a negative effect (Caputo et al. (2016)). Vrontis et al. (2017) concluded that the costs of acquiring external knowledge can negatively affect performance.

The organizational culture, geographic location, country, and kind of the business or product produced by the organization all have an impact on the adoption of inbound open innovation in organizations, whether they are large companies or small and medium-sized enterprises. (Rumanti et al. (2021)). Based on the above ambiguity of results, we re-examine the role of inbound open innovation on performance in the government sector environment, which is somewhat similar to small and medium enterprises, the second hypothesis can be formulated as follows:

H2: There is a statistically significant effect of inbound open innovation on organizational performance.

The role of outbound open innovation on performance:

Outbound open innovation refers to the utilization of technology and knowledge by an organization through marketing and technology transfer abroad in order to reap financial and non-financial benefits like revenue from licenses, patents, or contractual agreements, lessen obsolescence threats, and maintain competitiveness (Liao et al. (2020)). As a result, we expect the organization to improve its performance.

Internal inventions that are not being used by the company should be transferred outside of it (e.g., through spin-offs, joint ventures, or licensing) , it should be note Outbound open innovation can be done by an organization if it has been able to implement inbound open innovation (Popa et al. (2017)). And it helps organizations brings in financial resources or other benefits through helping other organizations develop new products or services. So we can assume:

H3: There is a statistically significant effect of outbound open innovation on organizational performance.

3 Research Methodology

Our survey included 2 latent constructs and 26 measurement items. Data collection was conducted at 25 public independent institutions in Jordan using a simple random probability sample. Questionnaires were distributed to all holders of administrative positions in the upper and middle categories and heads of departments in these organizations, as they are the makers and implementers of administrative decisions. 600 questionnaires were distributed to collect Quantitative data and we were able to collect 427. The number of questionnaires valid for analysis a reached after excluding questionnaires that did not meet the validity conditions 392 . Public independent institutions in Jordan contribute to the process of economic development by organizing and protecting the interests of vital sectors and increasing oversight over them, in addition to improving the quality of services provided. Also, Public independent institutions in Jordan are characterized by their almost complete independence from the executive authority, which ensures their neutrality and distance from the political pressures to which the state is exposed. The number of public independent institutions in Jordan (Based on report issued by the institutional performance department of the prime minister office in 2023) has reached 52 institutions that provide all services in various sectors and fields.

Measurement scale

The scales found in the study (Nobakht et al. (2021)) were used to test the independent variable open innovation, which was verified in the original studies, where 10 items from the study (Hung and Chou (2013)) were used to measure its Inbound and Outbound practices with sufficient reliability amounting to (= 0.858). α, $\alpha = 0.846)(\alpha = 0.89$, $\alpha = 0.88$) for each study, respectively. The composite reliability value for open innovation was (CR=0.913), and the average graduated variance value was (AVE=0.514). The dependent variable, organizational performance, was measured according to the balanced scorecard through four dimensions: financial, customers, internal operations, and learning and growth perspectives based on a study (Alrowwad et al. (2020)) using 12 items with sufficient reliability amounting to ($\alpha = 0.774$, $\alpha = 0.869$, $\alpha = 0.779$, $\alpha = 0.791$) for each dimension, respectively. The composite reliability value of the organizational performance dimensions ranged between (CR=0.94,0.95), and the value of the average variance extracted (AVE = 0.84, 0.82, 0.81,0.81), respectively. Balanced scorecards translate the organization's mission and strategy into a comprehensive set

of financial and non-financial performance measures that provide a framework for a strategic measurement and performance system Johnsen (2001).

Organizational performance, open innovation, were measured using the Likert scale. The scale ranged from 1, which denoted strong disagreement, to 5, which indicated strong agreement. The questionnaire was tested by testing the validity of the content by presenting it to a group of university professors specialized in this field to express their opinions and observations and take them all into consideration. Then, a qualitative exploratory test was conducted through a small judgmental sample with the aim of ensuring that the sampling unit understood the items included in the list and conducting a quantitative exploratory test. Through a stratified random sample of occupants of supervisory positions in 6 organizations who were selected at random, in order to ensure that the language of the measuring scale is understandable and easy, and to ensure the quality of the selected measures by measuring the stability of the scale and the validity of the internal consistency of its items using the Cronbach Alpha reliability coefficient and the Pearson correlation coefficient.

To evaluate the effect of CMV, Herman's one-factor approach with exploratory factor analysis (EFA) was used. There is no common method bias in our data because the percentage of variance explained is 48%. This is according to (Podsakoff et al. (2003)) study's, which confirmed There is no common method bias if the cumulative proportion of variance explained is less than 50% .

Correlation Analysis

Based on the study (Montgomery et al. (2021)), which shows that if the correlation coefficient is more than 80%, this represents the presence of a linear correlation. According to the correlation coefficients the results show a strong positive correlation between open innovation and performance ($r = 0.781$, $p < 0.01$), it is clear that there is no linear autocorrelation. After conducting multicollinearity test (via PLs) in order to inspect the existence of any collinear factors in the suggested model, following Field (2009), it was found that the values of the variance inflation factor (VIF) are all lower than 10 (inbound open innovation and outbound open innovation VIF = 2.27; its tolerance = 0.441). Thus, according to Field (2009), there is absence of collinearity among the collected data.

4 Evaluation of the measurement model

Convergent Validity

Table 1 below shows that the values of Cronbach's alpha coefficient for all variables are greater than 0.7, which means that there is high internal consistency for the dimensions used to measure the research variables. Also, the values of both Rho_A and CR are greater than 0.7, which confirms the high internal consistency between the items in these dimensions. (Leguina (2015)).

Table 1: Reliability and convergent validity indicators for the variables

	Cronbach's alpha	Composite reliability (rho_A)	Composite reliability (rho_C)	Average variance extracted (AVE)
Inbound	0.917	0.918	0.938	0.751
Outbound	0.857	0.860	0.903	0.699
Financial	0.910	0.913	0.937	0.789
Customer	0.889	0.890	0.923	0.750
Operations	0.890	0.891	0.924	0.752
Growth	0.928	0.928	0.949	0.822

Discriminant Validity

According to Fornell Larker in table 2, the square root of the average variance extracted for each variable in the model is greater than its correlation with other variables, and therefore the variables composing the study model here are characterized by discriminant validity(Hair Jr et al. (2014)).

Table 2: Discriminant validity using Fornell Larker

	Customer	outbound	Financial	Growth	Inbound	Operations
Customer	0.866					
Outbound	0.617	0.836				
Financial	0.683	0.555	0.888			
Growth	0.668	0.642	0.591	0.907		
Inbound	0.657	0.707	0.554	0.722	0.867	
Operations	0.809	0.542	0.621	0.690	0.680	0.867

5 Results

After evaluating the validity and reliability of the data, Smart PLS 4 used to investigate the proposed hypotheses. and structural equation modeling (SEM) method used to evaluate the fit of suggested model. The results show that (R2) for organizational performance (the dependent variable) reached 0.607, which means that the proposed research model explains 61% of organizational performance.

The following fit indices show that the data and our model agree well with the results:
$GOf = \sqrt{R2 * AVE} = \sqrt{0.79 * 0.761} = 0.78$

This study model can be trusted because it meets statistical requirements; the model's GOF value is 0.78 (> 0.36) (Wetzels et al. (2009)).

Table 3 below shows that there is a positive effect of open innovation on organizational performance ($\beta = 0.779$, P < 0.001), which means that open innovation contributes to increasing organizational performance by 78% at a significance level less than 0.001, and therefore the first hypothesis (H1) is accepted. Also, there is a positive effect of both inbound and outbound open innovation on organizational performance ($\beta = 0.544$: 0.294,

p ¡ 0.01), and this means that both inbound and outbound open innovation contribute to increasing organizational performance by 54% 29% respectively , and therefore (H2 and H3) hypotheses are accepted.

Table 3: Hypotheses results

H	Path analysis	Beta	T statistics	P values	Accepted / Rejected
H1	Open innovation − > Performance	0.779	37.387	0.000	Accepted
H2	Inbound innovation − > Performance	0.544	12.297	0.000	Accepted
H3	outbound innovation − > Performance	0.294	6.895	0.000	Accepted

6 Discussion and conclusions

According to the findings, open innovation has a positive impact on organizational performance with its two dimensions outbound and inbound. These findings are in line with those of earlier research projects (Spithoven et al. (2013), Carayannis and Grigoroudis (2014), Popa et al. (2017), Liao et al. (2020)). Despite the idea taken from the nature of the government sector that is not flexible and the resistance of its employees to new ideas, in addition to the influence of the organization's culture that combats the habit of applying modern strategies (Bigliardi et al. (2020)) , independent institutions in the Jordanian government sector succeeded in clarifying the positive role of open innovation in raising performance.

As for the dimensions of measuring variable organizational performance, it became clear that they are comprehensive dimensions that are useful in studying the performance of organizations, especially governmental ones, as they combine the financial performance aspect with the non-financial performance aspect, and thus added to the field of research in open innovation studies that did not study the effect of applying the open innovation strategy to the dimensions of organizational performance according to these balanced scorecards combined before.

Theoretical and Managerial Implications

The relationship between OI and company performance is still a topic of attention in the scientific literature. Reviewing the literature reveals that, when implemented by organizations with the necessary resources, the adoption of OI generally improves company performance. The results of the current study add to the controversy in previous literature regarding the role of open innovation in influencing organizational performance, and its impact was found to be positive even when applied in the government environment.

When it comes to inbound innovation, businesses must improve their skills in managing relationships with technology suppliers and develop a strategic plan for merging acquired and internal expertise to prevent inefficiencies. Regarding outbound innovation, companies must carefully assess their capacity for absorbing new ideas and put in place a strong intellectual property protection plan to minimize any risks associated

with the transfer of technology outside the company. Only then can they hope to reap the greatest benefits.

According to the 2033 road map created to modernize the public sector in the Kingdom, the goal over the next ten years is to create "an empowered and effective public sector that works as one unit to develop Jordan and achieve well-being for citizens." This study came to draw attention to some strategic management concepts that could contribute to achieving that goal it is open innovation strategy.

It is possible to contribute to the move toward the idea of a single government that functions as a single structure to provide integrated services to citizens, preventing overlap and duplication of tasks and functions and thereby providing a flexible horizontal service, when government institutions accept open innovation and concentrate on exploitation activity.

The adoption of creative solutions by public sector organizations, such as digitization of systems and automation of government work under the umbrella of exploratory and exploitative organizational ingenuity activities, will help to transform the government sector's typical work model, simplifying processes, removing the burden of government, and stop financial waste brought on by the misuse of resources. We do not overlook the role of open innovation activities in proactive planning to provide resources and predict future challenges and requirements, which are important enabling factors that help the government provide its services efficiently and sustainably according to precise principles.

When considering OI practices, a company should evaluate the risks associated with being open to outside information and technologies. It should also evaluate the expenses involved in not only utilizing new technologies but also protecting itself against potential threats. And it needs to be able to adjust its strategies in order to realign its innovation policies and maximize the benefits of new innovations. Additionally, in order to transform and maximize the application of external knowledge to enhance performance, businesses must expand their ability to absorb knowledge by seeking out, absorbing, and distributing it inside.

Limitations & Future Research

This research examined the direct relationship between open innovation and organizational performance. It would be good in future research to introduce absorptive capacity and knowledge management as a mediator factors. Absorptive capacity plays a role in capturing appropriate knowledge and technology and then absorbing, processing and managing it in a way that suits its internal strategy. Therefore, it can be considered the link between open innovation and performance. It is good to test the relationship between open innovation and performance again in the government sector and in other developing countries to indicate the need for this sector to pay attention to applying modern strategies such as innovation.

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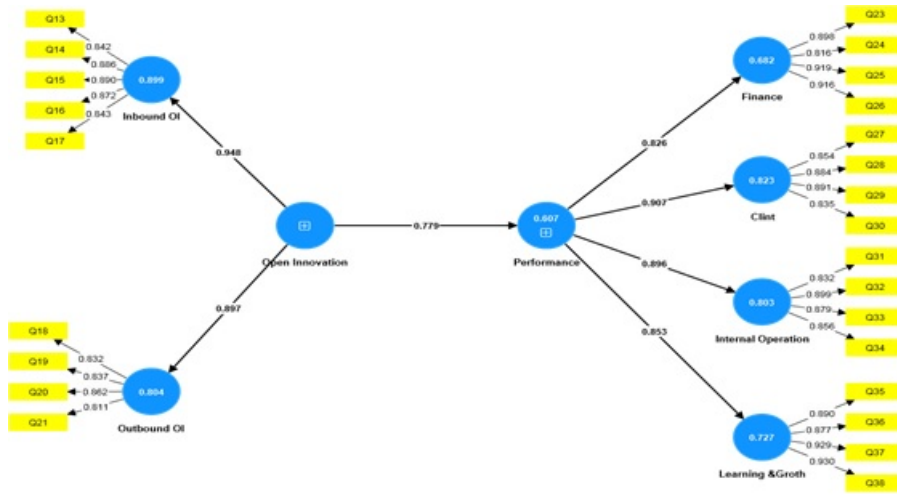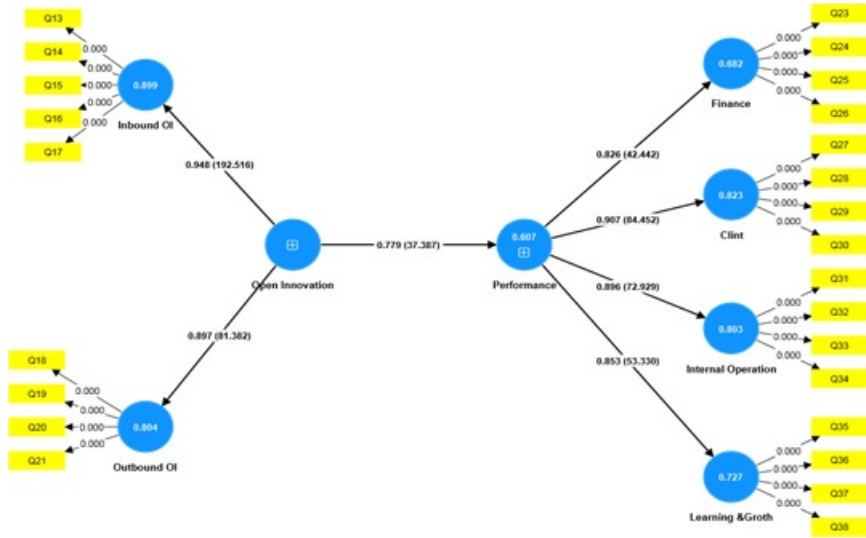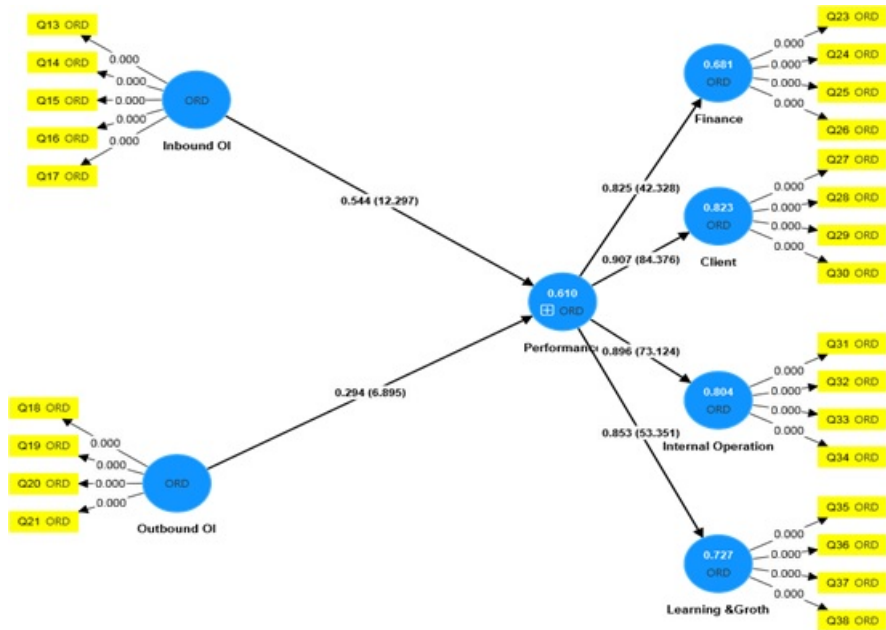
Appendix

Figure 2: Measurement Model

Figure 3: Structural Model for H1

Figure 4: Structural Model for H2&H3