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The impact of structural capital on Organizational innovation and Process innovation

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Abstract:

The value of structural capital is undeniable. This intellectual and strategic asset remains in the firm after employees have left (Bontis et al., 2015; Cabrita and Bontis, 2008; Curado, 2008; Nazari and Herremans, 2007; St-Pierre and Audet, 2011; Stewart, 1997). This means that structural capital is independent of employees and is generally explicit.

Within structural capital there are two main elements, namely intellectual property and infrastructure assets. Intellectual property refers to the elements of IC protected by law (e.g., commercial rights and intellectual property rights) and infrastructure refers to IC elements such as processes, corporate culture, information and networking systems and research projects, which can be generated within the firm or acquired from outside. Furthermore, in the literature, structural capital includes organisational and management processes, strategies, databases, software, information systems, routines, patents, copyrights, trademarks, brands, hardware, licenses, organisational culture, know-how, creativity and innovations (Filipe Sardo, 2018).

Keywords: Structural capital, Innovation, Process innovation, organizational innovation, organizational performance.

1. Introduction:

Good structural capital will translate the human dimension of innovation into company property. To do so, firms must support and nurture the brightest individuals to share their innovation, knowledge and abilities through organizational learning. Tacit issues such as managerial commitment, a common identity and shared vision, or a climate of openness and experimentation, compose the learning capability of the firm (Akgün et al., 2007). Nevertheless, while organized information cannot be a substitute for tacit knowledge, it can significantly enhance it to fill existing knowledge gaps; hence information technologies can support the innovation process (Adamides and Karacapilidis, 2006). In this vein, operational processes, information systems, organization culture, internal organizational structure, R&D efforts and administrative systems will have a positive influence on the innovative capabilities of the firm. Thus databases, procedure manuals, effective information systems, or cultural values devoted to innovation promotion can constitute important sources for innovative success (Tseng and Goo, 2005).

Structural capital, on its 'organizational side' includes (Wu et al., 2007) organizational processes which, among other things, have a positive effect on innovative performance, with reference to new products introduced by the firm in the market. Therefore, structural capital will be a source of product innovation if employees are encouraged and stimulated to create new ideas and to innovate to initiate new products, since it will increase their intrinsic motivation and enhance performance (De Castro, et al., 2010).

SC is the total of systematical studies, aimed at providing a lever by making the knowledge and skill, which are stated as the employee capital, institutional and forming an united OM. Every enterprise has its own unique SC. All of the immovable properties of an enterprise unite the SC and hardware, software, database, organizational structure, patents and trademarks form the SC (Koraz, 2011).

The SC is the mechanisms and structures, which help to support employees. It comprises all non-human storehouses of knowledge in organizations including the databases, organizational charts, process manuals, strategies, routines and anything whose value to the company is higher than its material value. It's as what remains in the company when

employees go home. In contrast to HC, SC can be owned by the organization and therefore can be traded. The SC deals with the mechanisms and structures of the organization that can help support employees in their quest for optimum intellectual performance and therefore overall business performance (Koraz, 2011).

On the other hand, once influenced by HC, SC exists objectively independent of HC. For example, organizational structure and company culture can exert foundational effects independently. SC can be classified into company culture, organizational structure, OL, operational process, and information system. A company's culture is the values, faith and behavior criteria approved and shared by all the staff. Values are what a company regards as the most important to its business, employees and customers. Faith refers to an employee's attitude towards himself, his company and customers. Meanwhile behavioral criteria are the unwritten rules emphasizing such matters as employees' appearance and cooperation with one another. Company culture under the guidance of a favorable managing philosophy is a valuable asset. Only under the strong culture can a company give full play to its employees' competence and motivate them to serve the company and customer heart and soul (Koraz, 2011).

Organizational structure is the power and responsibility structure formed in the managing process. This power and responsibility structure can find expression in the policy-making structure, the leading structure, the controlling structure and the information structure. Organizational structure is both static and dynamic since organizational structure includes not only the formal organizational relationship consisting of the power relationship and the control system, but also the informal organizational relationship. On the other hand, organizational structure is influenced by its internal and external environments; as a result, there will be an organizational change to promote the organizational development. Some managers usually believe that the more they learn about the change, the better they will manage it and the better the company will perform. Organizational competence is the result of the perennial learning and accumulating, and it is becoming one of the most important core competences of a company. It is affirmed that in the twenty-first century the only way for a successful company to maintain its competitive excellence is to be quicker in learning than its competitors. The operational process, which ensures a company to complete its various

operational tasks, is the most effective working methods and processes after a long-term accumulation and deposition. The total quality management and the company reconstruction, which are popular in the later twentieth century, focus on the reform in operational processes in order to increase operational efficiency and reduce production cost. The information system includes the storage, disposal and transmission of the inner information of a company. A favorable information system enables a company to quicken the flow of the inner information, heighten the operational efficiency, and hasten learning within the company (Koraz, 2011).

According to those introductions, this study was conducted to examine about impact of structural capital on business innovation.

2. Description of data and sample:

The purpose of the present study was to investigate the impact of Structural capital on organizational innovation and process innovation. For achieving this, the researcher developed a model that demonstrates the different impact of structural capital on:

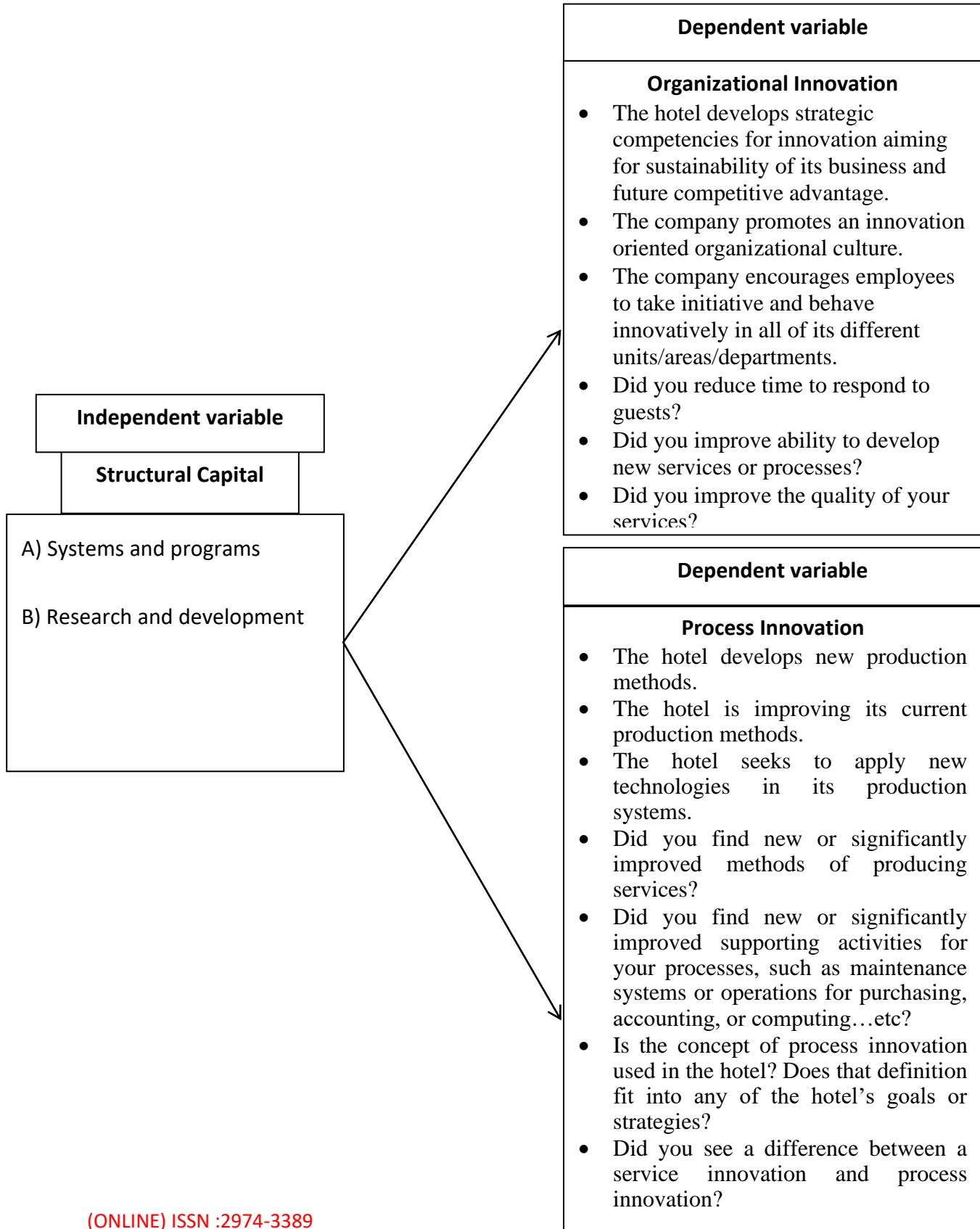
- a) Organizational innovation
- b) Process innovation

The sample consists of 160 observations. The study period was from August 2022 to February 2023.

The study was conducted on the hospitality sector in Egypt, especially five-star hotels in Hurghada. Forty-five five-star hotels in Hurghada were selected, and the survey was conducted on the first-line leaders of those hotels, including managers and executives (top level management employees).

The sample size is crucial because it can influence the degree of variation in covariance matrices. In this regard, more trustworthy, valid, and extrapolable results will arise from having a sufficient sample and high-quality data gathering efforts.

3. Research variables:



3.1 The independent variable (Structural Capital):

The organization itself embodies structural tacit knowledge, which exists in the myriads of relationships that enable the organization to function in a coordinated way, but are reasonably understood by at most the participants in the relationship, this means that, the organization is accomplishing its aims by following rules that are not known as such to most of the participants in the organization. An individual can have a high level of intellect, but if the organization has poor systems and procedures by which to track his actions, the overall IC will not reach its fullest potential. An organization with strong SC will have a supportive culture that allows individuals to learn. Structuring intellectual assets with information systems can turn individual knowhow into group property (Bontis, 1998).

SC is the supporting infrastructure of HC, hence there are two kinds of IC: organizational and customer capital. Organizational SC, which is the ways of running the business, management systems, drafts, means of control, information and communication systems, value management systems such as finances, investments, accountancy, development, relationship with other employees, database, documentation and intellectual assets such as patents, copyright, licenses etc. This type of capital enables an organization to function in a systematic and codified way. The customer capital encompasses the relationships with customers and data bases with relevant information on customers. If we encompass relationships with the suppliers and partners as well then the term relationship capital is more appropriate (Zagreb, 2007).

3.2. The dependent variables:

3.2.1. Organizational innovation:

Organizational innovation is 'nonroutine, significant, and discontinuous organizational change that embodies a new idea that is not consistent with the current concept of the organization's business'. This approach defines an innovative organization as one that is intelligent and creative, capable of learning effectively and creating new knowledge. Cohen and Levinthal (1990) argue that innovative outputs depend on the prior accumulation of knowledge that enables innovators to assimilate and exploit new knowledge. From this

perspective, understanding the role of cognition and organizational learning in fostering or inhibiting innovation becomes crucially important (Alice Lam, 2004).

3.2.2. Process innovation:

Process innovation involves new ways of producing goods and services.

Process innovation includes major changes in methods, equipment and/or software. A new type of production method can be an example of process innovation.

4. Methodology:

The researcher will use a hypothesis-testing strategy, such as field research and structured questionnaires, to investigate the link between the relevant variables. This study uses a hypothesis testing research approach since its primary goal is to examine how IC affects organizational performance and commercial innovation.

The current study is carried out in five star hotels in Hurgada. In order to achieve the research purposes, research could be embarked on wherein the needed information is gathered.

5. Results:

Statistical Data Analysis

The researcher reviewed all the data to ensure completeness and validity of data entry and statistical analysis, and then discharged using the computerized Statistical Package for Social Sciences (SPSS) Statistical Package for Social Sciences.

This suggests most of the studies to assess the categories of the weighted average according to the criteria for the approval and full consent or not, within the framework of the Likert five- trend Likert Scale measure used in this research as follows:

| scale | interval |
|-------------|-------------------|
| 1 - 1.79 | (Strong disagree) |
| 1.80 - 2.59 | (Disagree) |
| 2.60 - 3.29 | (Entirely) |
| 3.30 – 4.19 | (Agree) |
| 4.20 – 5 | (Strong agree) |

Table (1) Reliability and Validity of dimensions (The impact of structural capital on organizational innovation and process innovation in the Hospitality industry in Egypt) By using the Cronbach alpha coefficient

| ser | Dimensions | Reliability | Validity |
|-----|---------------------------|-------------|----------|
| x1 | Structural capital | .809 | .899 |
| y1 | Organizational Innovation | .739 | .859 |
| y2 | Process Innovation | .843 | .918 |

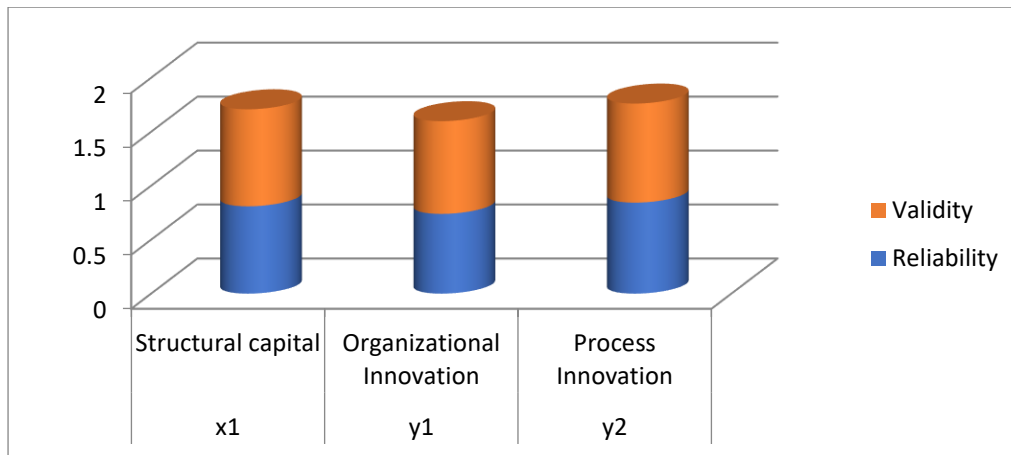


Table (2) Descriptive Statistical (Mean, Std. Deviation, Relative importance and rank) about the axis (Structural capital)

| phrases | Mean | Std. Deviation | Relative importance | Rank |
|--|------|----------------|---------------------|------|
| 1- Systems and programs | | | | |
| 1-The hotel has succession training programs for each and every post position (major positions). | 4.43 | .59 | 88.60 | 2 |
| 2-The hotel's culture and atmosphere are | 3.71 | 1.09 | 74.20 | 6 |

| phrases | Mean | Std. Deviation | Relative importance | Rank |
|---|-------------|----------------|---------------------|----------|
| supportive and comfortable. | | | | |
| 3-The hotel's recruitment programs are comprehensive and dedicated to hiring the best candidates available. | 4.10 | .88 | 82 | 3 |
| 4-The hotel has a well-developed reward system related to performance. | 3.92 | 1.04 | 78.40 | 4 |
| 5-The Hotel supports its systems according to the official hotel standards. | 3.89 | .92 | 77.80 | 5 |
| 6-Staff has sufficient influence over decision make within the hotel. | 3.37 | 1.13 | 67.40 | 9 |
| 7-The hotel is not very bureaucratic | 3.40 | 1.14 | 68.00 | 8 |
| 8-The hotel's systems and programs affect the hotel's value in the relevant market | 3.60 | 1.16 | 72 | 7 |
| 9-There is trust between the organization and its employees. | 4.47 | .51 | 89.40 | 1 |
| Mean Average | 3.87 | .56 | 77.51% | - |
| 2- Research and Development | | | | |
| 10-The hotel continuously develops and re-organizes itself based on research and development. | 3.25 | 1.15 | 65 | 2 |
| 11-The hotel determines appropriate and adequate budget for research and development. | 3.40 | 1.12 | 68 | 1 |
| 12-The hotel's board of management highly trust and support research and development. | 2.31 | 1.29 | 46.20 | 4 |
| 13-Hotel research and development affects the hotel's value in the relevant market | 2.45 | 1.28 | 49.00 | 3 |
| Mean Average | 2.85 | .90 | 57% | - |
| Total: Structural capital | 3.36 | .66 | 67.26% | - |

The general trend of the study variable (Structural capital), indicates that it is towards the between (strongly Agreement, Agreement), with mean of (3.36), and the Std. Deviation (0.66), with Relative importance (67.26%).

Systems and programs

The general trend of the study variable (Systems and programs), indicates that it is towards the (strongly Agreement, Agreement), with mean of (3.87), and the Std. Deviation (0.56), with Relative importance (77.51%).

The most Important statements are (There is trust between the organization and its employees), (The Hotel has succession training programs for each and every post position (major positions)), (The Hotel's recruitment programs are comprehensive and dedicated to hiring the best candidates available), with Relative importance (89.40%), (88.60%), (82%), respectively.

And the least important statement is, (Staff has sufficient influence over decisions make within the hotel), with Relative importance (67.40%). According to the responses of the study sample

Research and Development

The general trend of the study variable (Research and Development), indicates that it is towards the (disagreement, neutral), with mean of (2.85), and the Std. Deviation (.90), with Relative importance (57%).

The most Important statements are (The Hotel determines appropriate and adequate budget for Research and development) and (The Hotel continuously develops and re-organizes itself based on research and development), with Relative importance (68%), (65%), respectively.

The less important statement is, (The Hotel's board of management highly trust and support the research and development), with Relative importance (46.20%), according to the responses of the study sample.

Table (3) Descriptive Statistical (Mean, Std. Deviation, Relative importance and rank) about the axis (Organizational innovation and process innovation)

| Phrases | Mean | Std. Deviation | Relative importance | Rank |
|--|------|----------------|---------------------|------|
| 1- Organizational Innovation | | | | |
| 1-The hotel develops strategic competencies for innovation aiming for sustainability of its business and future competitive advantage. | 4.07 | 939. | 81.40 | 2 |

| Phrases | Mean | Std. Deviation | Relative importance | Rank |
|--|-------------|----------------|---------------------|----------|
| 2-The hotel promotes an innovation-oriented organizational culture. | 3.75 | 1.093 | 75 | 4 |
| 3-The hotel encourages employees to take initiative and behave innovatively in all of its different units/areas/departments. | 2.82 | 1.452 | 56.40 | 6 |
| 4-Did you reduce time to respond to guests? | 4.47 | 552. | 89.40 | 1 |
| 5-Did you improve ability to develop new services or processes? | 3.69 | 921. | 73.80 | 5 |
| 6-Did you improve the quality of your services? | 4.03 | 955. | 80.60 | 3 |
| Mean Average | 3.80 | .53 | 76.07% | - |
| 2- Process Innovation | | | | |
| 1-The hotel develops new production methods. | 3.15 | 1.378 | 63 | 5 |
| 2-The hotel is improving its current production methods. | 3.09 | 1.430 | 61.80 | 6 |
| 3-The hotel seeks to apply new technologies in its production systems. | 2.42 | 1.476 | 48.40 | 7 |
| 4-Did you find new or significantly improved methods of producing services? | 3.79 | 980. | 75.80 | 3 |
| 5-Did you find new or significantly improved supporting activities for your processes, such as maintenance systems or operations for purchasing, accounting, or computing ... etc? | 4.32 | 669. | 86.40 | 1 |
| 6-Is the concept of process innovation used in the hotel? Does that definition fit into any of the hotel's goals or strategies? | 3.31 | 1.361 | 66.20 | 4 |
| 7-Did you see a difference between a service innovation and process innovation? | 4.18 | 778. | 83.60 | 2 |
| Mean Average | 3.46 | .50 | 69.30% | - |
| Total: Business innovation | 3.77 | .37 | 75.60% | - |

The general trend of the study variable (Business innovation), indicates that it is towards the between (strongly Agree) and (Agree), with mean of (3.77), and the Std. Deviation (0.37), with Relative importance (75.60%).

Organizational Innovation:

The general trend of the study variable (**Organizational Innovation**), indicates that it is towards the (Agreement), with mean of (**3.80**), and the Std. Deviation (0.53), with Relative importance (**76.07%**).

The most Important statements are (Did you Reduce time to respond to guests), (The hotel develops strategic competencies for innovation aiming for sustainability of its business and future competitive advantage), (Did you Improve quality of your services), with Relative importance (89.40%), (81.40%),(80.60%), respectively.

And the least important statement is, (The hotel encourages employees to take initiative and behave innovatively in all of its different units/areas/departments), with Relative importance (56.40%). According to the responses of the study sample

Process Innovation

The general trend of the study variable (**Process Innovation**), indicates that it is towards the (Agreement and neutral), with mean of (3.46), and the Std. Deviation (.50), with Relative importance (**69.30%**).

The most Important statements are (Did you find new or significantly improved supporting activities for your processes, such as maintenance systems or operations for purchasing, accounting, or computing), (Did you see a difference between a service innovation and process innovation) and (Did you find new or significantly improved methods of producing services), with Relative importance (86.40%), (83.60%),(75.80%), respectively.

And the least important statement is, (The company seeks to apply new technologies in its production systems), with Relative importance (48.40%), according to the responses of the sample of the study.

Structural capital has a significant positive impact on Organizational Innovation.

-Variables Hypothesis

- Structural capital (independent)
- Organizational Innovation (dependent)

-Statistical method used:

Correlation coefficient Pearson

Table (4) Correlation between Structural capital and (Organizational Innovation) By using Pearson correlation

| Relationship | r | Sig. |
|--|-------|-------|
| Structural capital and Organizational Innovation | 0.434 | .01** |

** correlation is significant level 0.01

The values of the correlation coefficients (r) is (.434) with a significant level less than (.01).indicate a statistically significant relationship between the Structural capital and Organizational Innovation.

-Prove the research hypothesis:

Accepted the statistical alternative hypothesis of a relationship between Structural capital and Organizational Innovation.

- Regression equation to prove the extent to which the impact (Structural capital) on (Organizational Innovation)

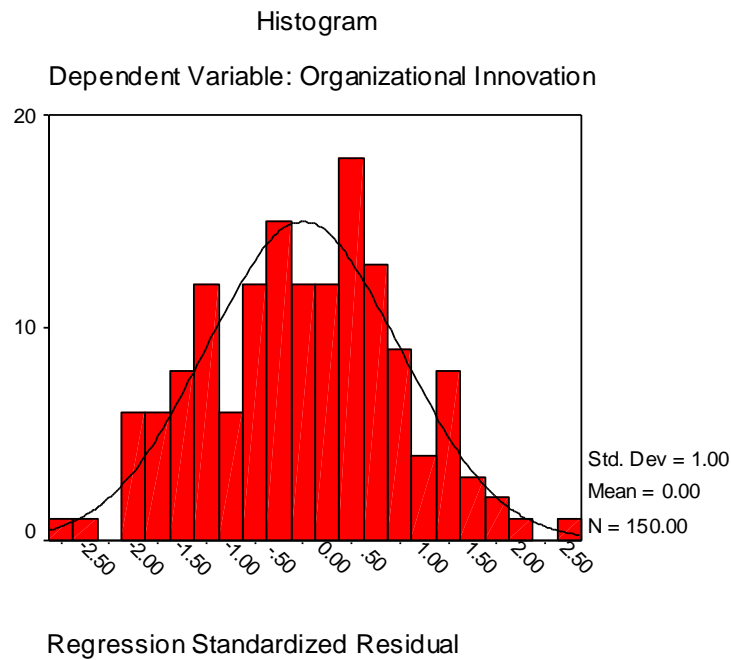
The impact of structural capital on Organizational Innovation

Table (5) The impact of "Structural capital " on " Organizational Innovation "

Using Liner Regression

| Independent variables | β | t. test | | F. test | | R ² |
|-----------------------|---------|---------|-------|---------|-------|----------------|
| | | Value | Sig. | Value | Sig. | |
| constant | 2.164 | 7.659 | .01** | 34.326 | **.01 | .188% |
| Structural capital | .434 | 5.859 | .01** | | | |

** significant level 0.01



4-Equation of the form:

Organizational Innovation = 2.164 + .434 Structural capital

Prove the research hypothesis:

Accepted the statistical alternative hypothesis there is an impact of " Structural capital on Organizational Innovation ".

Structural capital has a significant positive impact on Process Innovation.

Variables Hypothesis

- Structural capital (independent)
- Process Innovation (dependent)

Statistical method used:

Correlation coefficient Pearson

Table (6) Correlation between Structural capital and (Process Innovation) By using Pearson correlation

| Relationship | r | Sig. |
|--------------|---|------|
|--------------|---|------|

| | | |
|---|-------|-------|
| Structural capital and Process Innovation | 0.512 | .01** |
|---|-------|-------|

** correlation is significant level 0.01

From the above table it is clear:

The values of the correlation coefficients (r) is (.512) with a significant level less than (.01).indicate a statistically significant relationship between the Structural capital and Process Innovation.

Prove the hypothesis research:

Accepted the statistical alternative hypothesis of a relationship between Structural capital and Process Innovation.

Regression equation to prove the extent to which the impact (Structural capital) on (Process Innovation)

The impact of structural capital on Process Innovation

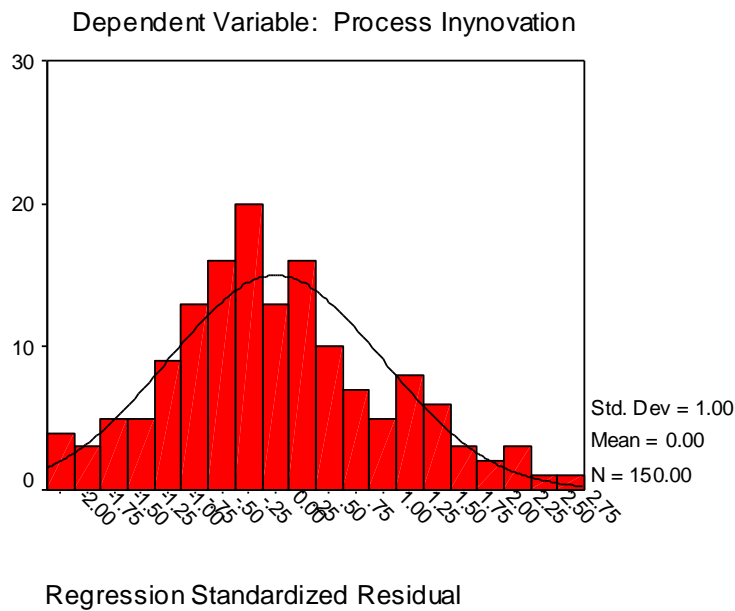
Table (7) The impact of "Structural capital " on " Process Innovation "

Using Liner Regression

| Independent variables | β | t. test | | F. test | | R ² |
|---------------------------|---------|---------|-------|---------|-------|----------------|
| | | Value | Sig. | Value | Sig. | |
| Constant | 1.646 | 6.490 | .01** | 52.518 | **.01 | 26.2% |
| Structural capital | .512 | 7.247 | .01** | | | |

** significant level 0.01

Histogram



4-Equation of the form:

Process Innovation = 1.646 + .512 Structural capital x3

-Prove the hypothesis research:

Accepted the statistical alternative hypothesis there is an impact of "Structural capital on Process Innovation ".

Conclusion:

- The overall characteristic of structural capital proportional weighted mean value 67.26% has weakness in its structural. Components especially “research and development” which represents the lowest proportional weight mean value 57%.
- The questionnaire reflected a crucial concern where “systems and programs” are supercilious and are considered the main reason which is supercilious to affect the business innovation.
- By realizing and understanding the importance of IC and innovation, hotels can improve their competitive advantage. It shows the importance of relationship between intellectual capital components and innovation, and the importance of management is investments of these capitals in hotels.
- Top level management should sustain, protect, develop and manage intellectual capital to increase business innovation as a creator of competitive advantage for the hotels.
- The independent variable (Structural capital) explains (.188%) of the total change in the dependent variable (Organizational Innovation), which have a significant significance.
- The existence of a statistically significant impact of all dimensions (Structural capital) on the (Organizational Innovation) according based on the Test (T) equal (5.859), where we find that the level of indication is less than 0.01.
- To test quality of the conciliation model as a whole, was used for test (F-test), where the value of the test is (34.326), which are significant at a level less than (0.01), which indicates the quality of the impact significant of the regression model on (Organizational Innovation).
- The independent variable (Structural capital) explains (26.2%) of the total change in the dependent variable (Process Innovation), which have a significant significance.
- The existence of a statistically significant impact of all dimensions (Structural capital) on the (Process Innovation) according based on the Test (T) equal (7.247), where we find that the level of indication is less than 0.01.
- To test quality of the conciliation model as a whole, was used for test (F-test), where the value of the test is (52.518), which are significant at a level less than (0.01), which indicates the quality of the impact significant of the regression model on (Process Innovation).

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