



THE ROLE OF PRODUCT INNOVATION IN IMPROVEMENT OF SUPPLY CHAIN PERFORMANCE AN ANALYTICAL STUDY OF THE OPINIONS OF A SAMPLE OF TECHNICIANS WHO WORK IN ENGINEERING OFFICES AND MEDICAL LABORATORIES DEPLOYED IN SOME IRAQI GOVERNORATES

Sajjad Raad Khalaf Hussien

University of Al-Qadisiyah / College of Administration and Economics / Business Administration Department
(Mang-mang16.43@qu.edu.iq)

Prof Dr. Atheer Abdul Ameer Hassoni

University of Al-Qadisiyah / College of Administration and Economics / Business Administration Department
(Atheer.almashady@qu.edu.iq)

Article history:	Abstract:
Received: **th 2023 Accepted: **th 2023 Published: **th 2023	The study sought to search for the role of product innovation in improving of supply chain performance with its dimensions (quality, flexibility, cost, delivery) in engineering offices and medical laboratories deployed in some Iraqi governorates (Baghdad, Babyl, Najaf, Karbala , Mosul, Erbil). The problem of the study was to ask The main (what is the role of product innovation in improving supply chain performance), the study sample included technicians working in engineering offices and medical laboratories, and the questionnaire was used to collect data, as the number of responses was (192) an answer It was obtained from the technicians working in those engineering offices and medical laboratories deployed in some Iraqi governorates. The random sampling method was adopted. The research used the descriptive analytical approach in the study, and then the data was analyzed by adopting some statistical methods such as (the arithmetic mean, standard deviation, linear correlation coefficient, simple and multiple regression coefficient) and the scale was tested using (Alpha Cronbach, factor analysis), and the results were reached using Statistical programs such as (SPSS.V.27) and (Amos.V.26), where the results of the study confirmed that there are Role to product innovation in supply chain performance.

Keywords: product innovation , supply chain performance.

INTRODUCTION

Product innovation is a vital subject for industrial organizations as well as the economy at large. With labor costs and social costs rising, modern businesses are looking for ways to gain a competitive advantage. As a result, they are paying more attention to innovations and diversified thinking opportunities and even prioritizing them after they have demonstrated their ability to achieve many possibilities of remaining in the market and proving more merit. This interest is frequently caused by the significance given by product innovation to create added value for more target groups of customers. According to (Mostaghel et al.,2019:1), a product innovation is positively associated with the quality of supply chain performance, Organizing supply chain operations from market knowledge to manufacturing and marketing enables organizations to manage complex and implicit Customer preferences, improve design insights, accelerate product

development, facilitate timely product launches, and provide stronger positioning and better compliance for new products. The goal of the current research is to Clarify the variables influencing the connection between supply chain performance and product innovation. This research attempts to address this by responding to the following query (what is the role of product innovation in the supply chain performance). By presenting assumptions based on the disagreement in the previous studies, this study sought to address this important question and its implications. In light of these assumptions, the study developed a conceptual and hypothetical model that contextualized the relationship between study variables in a way that gives significance. a theoretical addition to supply chain management and marketing research.



II. RESEARCH METHODOLOGY

1) THE RESEARCH PROBLEM

The ability of an organization to develop various new designs quickly and affordably, as well as to allocate resources for new product development, is referred to as developing product innovation capability. The manufacturing organization is not the only one in charge of the actions involved in product design. The effectiveness of product innovation is also increased by the close connection with suppliers. On the other hand, when more than one organization is in charge of creating innovative products, there needs to be a method for quickly sharing new product design concepts, including files, prototypes, etc., with all participants in the supply chain (Pujawan,2004:85). This study also aims to understand the pattern of products of engineering offices and medical laboratories from prototypes to dental molds, prosthetics, etc. of their products in relation to the intention of product innovation. (What role does product innovation play in enhancing the effectiveness of the supply chain?) and looks to include the following sub-questions.

1. What part does product innovation play in the study population's engineering offices' and medical laboratories supply chains' performance improvement?
2. Do the technicians in the study population who work in engineering offices and medical laboratories have a clear understanding of the idea of product innovation?
3. How can product innovation in the engineering offices and medical laboratories of the study population support the supply chain performance?

2) THE RESEARCH IMPORTANCE

1. The topic of this study—the role of product innovation in enhancing supply chain performance—is important because, as far as the researcher is aware, there aren't many studies that link these two crucial areas of business administration knowledge, namely marketing management and production and operations management, particularly in the field of industrial organizations.

2. The industrial environment is one of the most important and critical environments for modern business, particularly in Iraq, and it directly affects the expansion

and development of the company. Therefore, undertaking studies that focus on the phenomena in this environment improves the likelihood of business success and industry growth.

3. The importance of the studied variables at the theoretical and practical levels in the areas of marketing management, production management, and operations management, as the research broadens knowledge in areas that are underrepresented in local and Arabic libraries, such as the issue of product innovation, which has emerged as a crucial requirement in the modern business environment to keep up with and satisfy customers' changing needs. These topics of supply chain are of great interest to researchers, and this enrichment is not limited to presentation and narration, It also includes identifying the nature of potential relationships between the study's variables, whether through discussion based on the logical and mental framework or at the level of practical testing of a set of hypotheses by tying these variables together.

3) RESEARCH OBJECTIVES

1. Determine the nature and concept of product innovation envisioned by the technologists working in the engineering offices and medical laboratories under study.
2. Determine the nature of workers' awareness of the supply chain and its performance measures in light of the activities carried out by the engineering offices and medical laboratories under study.
3. Identifying the level of the dimensions of the supply chain performance (quality, flexibility, cost, delivery) for the study sample.

4) Hypothetical Study Scheme

Figure 1 shows a hypothetical study chart that was prepared to reflect the relationship between the study variables in light of the study problem, its importance, and its objectives. As a result, the study variables can be seen in the following statements:

1. Independent Variable: - Product innovation this variable is measured as one-dimensional.
2. Dependent variable: - supply chain performance and is represented in four dimensions (Quality, Flexibility, cost, Delivery).

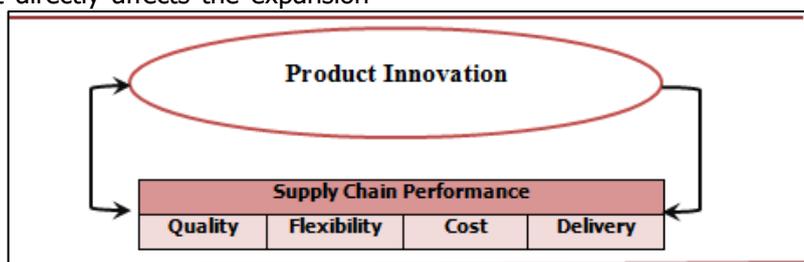


Figure 1 the hypothesis of the study

5) HYPOTHESIS OF RESEARCH

The research dealt with two variables

Ho-1: Product innovation and supply chain performance

are positively and significantly correlated.

Ho-1:- There is a significant effect relationship between product innovation and supply chain performance.



III. study population and sample

A sample of 192 technicians who worked in engineering offices and medical laboratories were used in the study. The researcher distributed (221) a questionnaire to the sampled respondents in order to gather the required data, and (192) a questionnaire and compiled retrieved and assembled in order to get them ready for the analysis process.

First: Product Innovation

Always, product innovation increases market share and strengthens leadership positions in various industries. It is a process whose successful management results in the success of the complete business organization while meeting the requirements necessary to give the organization the ability to convert business opportunities into innovative products (Trott, 2017:248). according to (Sinaga et al. 2021:1362) the product innovation is the introduction and development of new types of goods or services that differ from the ones that have come before or fill in the gaps left by current products with a focus on quality. Since businesses can develop brilliant concepts for the finest goods and services and improve them, innovation is a natural evolution of creative thinking. Since innovation is a fundamental need, it can be used to build a competitive advantage and, as a result, determine better business performance, which is important for both growth and survival in the face of fiercer competition. And (Maier et al., 2019:823) defined it is Bringing to market a new, redesigned, or substantially improved product or service, Creating a new product, altering the technical specifications and quality enhancements made to the product, or incorporating new materials and desirable functions into existing product components are all examples of product innovation by a company. According to (Ramadani et al., 2018:1), he divides product innovation into three categories: innovations in the product (providing a new or improved good or service); innovations in the process (providing new ways to organize and integrate inputs into the production process); and innovations in organizational (providing new or improved organization of resources). And (Heij et al., 2020:1) recognizes that the process of product innovation is a crucial indicator coming from ongoing processes of research and development that turn products into profitable and market-dominating ones.

Second: The importance of Product Innovation

Investment in product innovation is necessary for brands to build a competitive advantage and thrive in the quickly expanding markets. Offering improved goods and services improves the lives of consumers and spurs business and economic development (Li,2021:3). according to (Kotler et al, 2020:279) the organizations that constantly develop new products have twice the return on assets and three times the growth in operating income than organizations that do not. Thus, the new product development method has a positive effect on the

organization's success and chances of survival. As for (Agarwal, 2018:5) sees that the social and cultural environment's change resulted in the emergence of various new customer segments, making it necessary for organizations to shift their resources from products, distribution, and conventional communication channels to more creative ideas. To do this, these organizations must actively participate in the process of changing their brand and reaping the benefits of technology. and (Silva & Moreira, 2021:20) state that the following three areas are where product innovation is most extremely important:

1. Diversifying the organization's product portfolio in order to achieve differentiation and boost organizational efficiency.
2. Increasing specialization in the sector the organization operates in while improving technology.
3. Encourage suppliers to participate early.

Third: Supply Chain Performance

Organizations have committed themselves more and more to evaluating and monitoring their tasks in the supply chain, which is a crucial component of competitive advantage, in order to avoid failures and unmet objectives. Supply chain performance is crucial because it enables the deployment of supply chain strategies that help the organization accomplish its objectives. However, finding evaluable and measurable performance elements that offer feedback and promote coherence in the supply chain is still a challenge. Additionally, performance management increases effectiveness because it enables businesses to implement the best internal and external operational strategies without excluding any supply chain partners (Sosa et al, 2019:69). According to (Ka et al. 2019:40) Supply Chain Performance is a framework for assessing the effectiveness of the supply chain using potential methods that the authors and researchers have categorized as a set of approaches and techniques and after conducting a systematic review of the literature to achieve the supply chain's optimal performance of the participants. As for (Leonczuk, 2016:104) sees it as the ability of the supply chain to transport goods to the appropriate location at the appropriate time for the least amount of logistical expense. This definition considers the end consumer's value, cost, and delivery speed. Since it includes the three fundamental criteria for assessing control—effectiveness, efficiency, and impact—the authors believe that this definition encompasses the most crucial elements of supply chain performance. (Mouhsene et al., 2019:6336) indicated to supply chain performance is the method by which the organization manages the supply chain in accordance with functional strategies and objectives, and it is possible to define models for evaluating the supply chain relationship as a system consisting of key performance indicators in order to measure the effectiveness and efficiency of operations in order to achieve the levels of performance desired by the organization's strategy.



In fact, supply chain performance is one of the more challenging topics in business administration literature. Researchers used a variety of methods to assess supply chain performance, including flexibility, reliability, responsiveness, quality, and asset management. Similarly, some support efficiency and effectiveness-related success indicators, In a different strategy, some of them depend on the potential for evaluating performance enhancements through diversity, innovation, timing, cost, availability, and information sharing, which is a crucial element for effectively managing and leading supply chain relationships (Fatorachian & Kazemi, 2021:64).

Fourth: Supply Chain Performance importance

Supply chain performance is important and crucial for organizations to formulate strategy, communicate with its environment, and form diagnostic control mechanisms through the performance of actual results, and the following have been mentioned as goals of performance measurement systems (Akyuz&Erkan,2010:5138):-

1. Determine success.
2. Determine whether customers' needs have been met.
3. Better understanding of operations.
4. Identifying bottlenecks, problems and opportunities for improvement.
5. Make realistic decisions.
6. Be able to advance.
7. Follow up on progress.
8. Facilitating communication and cooperation that are more open and transparent.

And (Estampe, 2014:15) finds that the three fundamental goals of performance systems—determining success, being compliant with organizational strategies, and assuring communication between all supply chain participants—are shared by all supply chain management researchers. Additionally, systems in each scenario must take Processing chain performance into consideration when making decisions using a thorough approach. In this way, the organization's objectives must be consistent with its results and be measured by impartial performance methods.

The majority of organizations are now aware that developing an effective and efficient supply chain necessitates regular performance reviews by management. Whereas performance is viewed as a means of assessing how much the operational performance of the entire supply chain has improved, it is also a way to assess how the relationships among supply chain participants have fared, as these relationships are correlated with the chain's ability to increase operating rates, keep costs down, reduce inventory, and improve quality (Ali, 2020:103).

Fifth: The dimensions of Supply Chain Performance

1- Quality

A product or service's suitability to satisfy the requirements of the customer or go above and beyond the intended use is referred to as quality. Eight characteristics that can be used to describe quality are used to frame this concept: performance, features, reliability, connectivity, durability, serviceability, aesthetics, and quality observed (Mitra, 2021:7).according to (AminUllah, 2019:41) the quality in the supply chain is a philosophy that integrates the quality of the supplier's system, the internal system of the prestigious organization, and the quality the customer demands. A formal quality assurance system, continuous development, statistical process management, Six sigma limits, safe part tracking, and incoming material quality assurance are a few examples of quality indicators. As (Kannan & Tan, 2007:2) shows that quality is one of the primary factors in the creation of value throughout the supply chain. This is because organizations looking to boost performance reevaluate not only how their products get to consumers, but also how to better meet their needs. This could entail reevaluating all facets of their supply chain seriously, from how they determine what customers want and gauge whether they deliver on it to how they utilize their suppliers' capabilities and their own to fulfill customer commitments.

2- Flexibility

Means having the ability to react to changes in volume of customer demand, the mix of goods or services the organization offers, changes in product or service design features, or other factors may be involved in these changes, and In a rapidly evolving business environment, high flexibility can be a competitive advantage (Stevenson, 2021:42). According to (AminUllah,2019:41) supply chain flexibility is the ability to react quickly to unpredictably changing market conditions in order to establish or keep a competitive advantage. As a result, flexibility is a performance factor that considers how quickly manufacturing companies can react to the particular requirements of consumers. As for (Stevenson&Spring,2007:689) Describe the supply chain's flexibility using thirteen quick responses (machinery, material handling, operations, automation, labor, process orientation, product, new product design, delivery, product line expansion, production and market program).

3- Cost

The costs of The supply chain provides a framework for creating cost-based performance measures for activities that make up important supply chain operations, The capabilities offered by the supply chain include the ability to assess the overall effectiveness of the chain, spot areas for further development or re-engineering, measure the performance of activities or individual operations, assess alternative supply chain structures or partner selection, and assess the effects of technological



advancements (Lalonde&Pohlen,1996:11). Additionally, (Pettersson & Segerstedt, 2013:357) stated that the supply chain cost dimension includes costs like order processing costs, packaging costs, and wastage costs resulting from one or more of the following three: obsolete losses, transportation losses, and theft losses. These costs are associated with order processing, purchase and inventory, distribution or transportation, and warehouse costs. According to (Chibba, 2007:15), many organizations focus primarily on lowering direct costs and purchasing indirect costs rather than total costs. These expenses include expenses for purchasing, handling of goods, storage, financial inventory, administration, and growth. Cost and benchmark price have a close correlation. Price has become a more crucial factor in determining demand, particularly during the development and maturity phases of a product's life cycle.

4- Delivery

One of the most crucial jobs for supply chains is delivery, which involves organizing and managing the flow of goods and services from the supplier through the manufacturing or service provider to the end customer. Delivery also includes order administration, storage, and transportation (Daya et al, 2019:4728). Additionally, (Choi et al., 2007:11) stated that the delivery is the period of time between the time a customer places a purchase and the due date, and the majority of delivery due date models presumptively set each order's due date completely externally. However, in some real-world

situations, every order must be delivered by a specific due date, which designates the time in the future at which the customer wishes to receive the goods they ordered. In most situations, the due date is negotiable and the responsibility of the marketing team in the organization. according to (Deshpande, 2012:4).The faster the delivery speed, the better the supply chain's response, especially If the supply chain continuously satisfies the changing needs of customers, it contributes to the overall organization's growth. Also (Madhwal et al., 2022:48) stated that prospective customers favor vendors who are better at providing deliveries, and Vendors who are dedicated to providing deliveries at the designated location and at the appropriate time are more likely to thrive in modern industries, and Unreliable delivery results in higher operational costs, product holding costs, research costs, negotiation costs, and managerial controls, all of which worsen customer relations.

IV. the practical side of research

First: describing and Coding the study variables and their measures

The following table (1) shows the main variables and sub-dimensions involved in the analysis of the research and the symbols that describe them in a way that facilitates the reader to understand their meanings and the number of paragraphs that were used to measure each dimension to achieve the goal sought by the research.

Table (1) the main variables and sub-dimensions of Study , and stability factors

Variables	Cronbach's alpha variable	Dimensions	NO.	Cod	Cronbach's alpha Dimensions	Source
product innovation	0.891	One dimensional	12	PRI	0.891	(Aydin,2020:34)
supply chain performance	0.899	Quality	5	SCQU	0.876	Krajewski&Mal) hotra,2022:32)
		Flexibility	5	SCFL	0.887	
		Cost	5	SCCO	0.891	
		Delivery	5	SCDE	0.893	

Second: Confirmatory construct validity of product innovation Variable

The results indicate that all paragraphs of the product innovation variable obtained saturations greater than (30%), which is a one-dimensional variable that was interpreted through (12) items to settle at a matching quality index. 2.603) to achieve the required criterion less than (5), with a good fit index (GFI = 0.946) greater than

(0.90), and a corrected good fit index (AGFI = 0.922) greater than (0.90), and with an approximate root mean square error index (RMSEA = (0.068) higher than (0.05) and less than (0.08), and this shows that all indicators meet the standards set by (Hair et al., 2010). This is explained in the following table (2)

Table (2) Standard saturations for product innovation variable

Path	Standard weights	Non-standard weights	S.E.	C.R.	P	Label
PRI6 -----> product innovation	.986	1.000				



PRI7	----->	product innovation	.898	1.103	.042	26.352	***	par_1
PRI8	----->	product innovation	.951	.975	.026	36.925	***	par_2
PRI9	----->	product innovation	.932	.835	.026	32.549	***	par_3
PRI10	----->	product innovation	.980	1.015	.020	51.959	***	par_4
PRI11	----->	product innovation	.981	.964	.018	53.237	***	par_5
PRI12	----->	product innovation	.973	.963	.020	47.033	***	par_6
PRI5	----->	product innovation	.926	.937	.030	30.931	***	par_7
PRI4	----->	product innovation	.934	1.005	.030	33.007	***	par_8
PRI3	----->	product innovation	.938	1.018	.031	33.354	***	par_9
PRI2	----->	product innovation	.951	.902	.024	37.153	***	par_10
PRI1	----->	product innovation	.897	.798	.030	26.345	***	par_11

Third: Confirmatory construct validity of supply chain performance variable:

The results indicate that all of the supply chain performance variable's paragraphs are described by four variables and (20) items, they obtained saturations greater than (30%) to settle at a matching quality index. The value of chi square (X²) was attributed to the degree of freedom (df) of (1.785) to achieve the required

criterion less than (5), with a good fit index (GFI = 0.939) greater than (0.90), and a corrected good fit index (AGFI = 0.928) greater than (0.90), and with an approximate root mean square error index (RMSEA = 0.066) higher than (0.05) and less than (0.08), and this shows that all indicators meet the standards set by (Hair et al., 2010). This is shown in the following table (3)

Table (3) Standard saturations for supply chain performance variable

Path		Standard weights	Non-standard weights	S.E.	C.R.	P	Label
SCQU1	----->	Quality	.904	1.000			
SCQU2	----->	Quality	.932	1.052	.047	22.538	*** par_1
SCQU3	----->	Quality	.968	1.059	.042	25.327	*** par_2
SCQU4	----->	Quality	.970	1.084	.042	25.591	*** par_3
SCQU5	----->	Quality	.966	1.162	.046	25.042	*** par_4
SCFL1	----->	Flexibility	.975	1.000			
SCFL2	----->	Flexibility	.989	1.078	.022	50.002	*** par_5
SCFL3	----->	Flexibility	.973	.967	.023	42.134	*** par_6
SCFL4	----->	Flexibility	.982	1.141	.025	45.916	*** par_7
SCFL5	----->	Flexibility	.917	.940	.034	28.012	*** par_8
SCCO1	----->	Cost	.969	1.000			
SCCO2	----->	Cost	.982	1.103	.026	43.036	*** par_9
SCCO3	----->	Cost	.976	1.110	.027	40.533	*** par_10
SCCO4	----->	Cost	.976	1.161	.029	40.484	*** par_11
SCCO5	----->	Cost	.962	1.143	.032	35.805	*** par_12
SCDE1	----->	Delivery	.905	1.000			
SCDE2	----->	Delivery	.969	1.213	.047	25.820	*** par_13
SCDE3	----->	Delivery	.957	1.117	.046	24.542	*** par_14
SCDE4	----->	Delivery	.969	1.084	.042	25.851	*** par_15
SCDE5	----->	Delivery	.937	.939	.041	23.067	*** par_16



Fourth: Statistical description of product innovation variable

Based on the research's study results, technicians who work in engineering offices and medical laboratories deployed throughout some Iraqi governorates agreed with the product innovation variable and their relative importance it at 84%, which indicates a propensity for these workers to concentrate on introducing new products in a form that is continuing and motivating. as the technicians who work in engineering offices and medical laboratories deployed in some Iraqi governorates show a high arithmetic mean (4.21) and a standard deviation equal to (0.730) so that technicians who work in engineering offices and medical laboratories deployed

Table (4) Descriptive statistics for product innovation variable

product innovation variable					
Mean	4.21	Standard deviation	0.730	Relative importance	84%

Fourth: Statistical description of supply chain performance variable

It can be seen from the study sample's responses in the table (5) that the quality dimension, which had a high arithmetic mean (4.26) and an inclination towards agreement, was placed first among the supply chain performance dimensions, indicating the agreement of workers in engineering offices. and medical laboratories deployed in some Iraqi governorates towards providing products with specifications that meet With the customer's expectations and exceeding their expectations, in order to improve the relative importance level by (85%), with a good level of availability and a standard deviation of (0.702), Also, it became clear through the sample answers that all dimensions of the

Table (5) Matrix of descriptive statistics for supply chain performance variable

S	Dimension	Mean	Standard deviation	Relative importance	Availability level	Importance
1	Quality	4.26	0.702	85%	Available	1
2	Flexibility	4.07	0.832	81%	Available	4
3	Cost	4.09	0.874	82%	Available	3
4	Delivery	4.14	0.817	83%	Available	2
Supply chain performance variable						
Mean	4.14	Standard deviation	0.799	Relative importance	83%	

Third: Hypothesis testing First main hypothesis

Product innovation and supply chain performance are positively and significantly correlated.

It can be seen from the results in Table No. (6) that there is a strong correlation between product innovation and supply chain performance. This correlation was estimated to be strongly (0.780), and the strength of the correlation ranged between product innovation and supply chain performance dimensions, ranging from (0.760) for the flexibility dimension to (0.780) for the

in some Iraqi governorates by focusing on developing high-quality products, and this is within the interest oriented towards agreement and with a high arithmetic mean (4.41) and a standard deviation of (0.672) to show the interest of technicians towards improving their innovative capabilities by observing the innovations of competitors offered in the market and with good relative importance (88%)) with an arithmetic mean ranging (3.91-4.41) so that technicians can have a relative importance (78 %-88%) to improve their ability to develop good features products continuously by adopting leadership and new ideas about these products and monitoring them continuously, and the following table (4) illustrates this.

supply chain performance variable obtained an arithmetic mean ranging between (4.07-4.26) and relative importance (81%-85%) to indicate the awareness of the studied sample of the importance of product innovation in improving the supply chain performance.

The general arithmetic mean of the supply chain performance variable, as shown in table (5) below, was (4.14) with a standard deviation of (0.799), indicating that the sample of technicians working in engineering offices and medical laboratories deployed in some Iraqi governorates recognized the importance of the supply chain performance by focusing on the principle of quality and emphasizing on improving the quality of products through developing skills, attracting and training workers, and this is of relative importance (83%).

quality dimension. and this indicates the intent of staff members working in engineering offices and medical laboratories stationed in some Iraqi governorates to enhance their ability to react to changing consumer demands. On the basis of the aforementioned, it is possible to accept the validity of the first main hypothesis, which states (there is a statistically significant relationship between product innovation and supply chain performance), and this indicates that the sample places an emphasis on continuously releasing the new products onto the market and cultivating an innovative culture in

addition to research and analysis. Regarding the tools and newest technologies suppliers offer to support the creation of their goods.

Table (6) Correlation Matrix The relationship between product innovation and Supply chain performance

variables	product innovation	
Quality	0.780	
Delivery	0.778	
Cost	0.760	
Flexibility	0.760	
Supply chain performance	0.780	

****.** Correlation is significant at the 0.01 level (2-tailed).

Second main hypothesis

There is a significant effect relationship between product innovation and supply chain performance.

The results of table (7) show that the product innovation model contributed to explaining the supply chain performance by (0.608), showing that increasing product innovation by one unit results in an improvement (0.850),

so that the engineers who work in engineering offices and the spread of medical labs in some Iraqi governorates become Promoting a Culture of Innovation and providing new ideas about products by reducing the standard error rate (0.044) to the lowest possible level, with a critical value higher than (1.96) to reach (19.318).

Table (7) Results of analyzing the effect relationship between product innovation and supply chain performance

Path	standard weights	standard error	critical value	R2	(P)
product innovation → supply chain performance	0.850	0.044	19.318	0.608	0.001

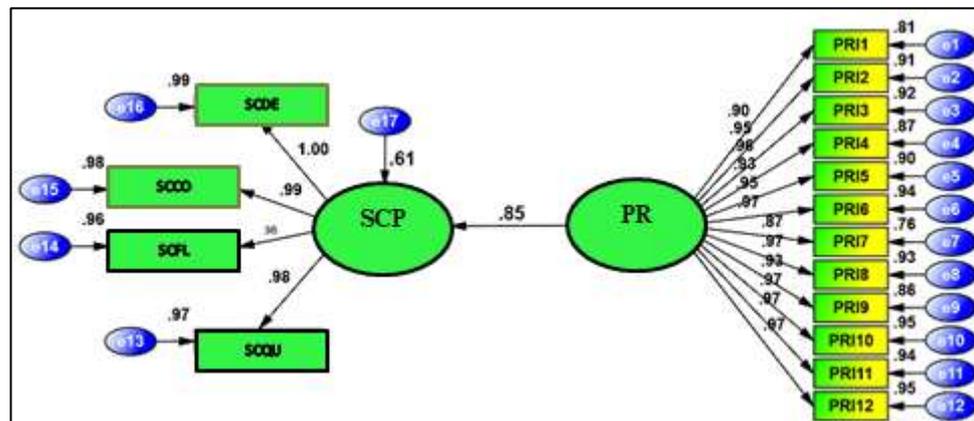


Figure 2 Standard model of the effect of product innovation on supply chain performance

VIII. Conclusions and Recommendations
Conclusions

1. The results indicate a strong relationship between supply chain performance and product innovation, which means that technicians working in engineering offices and medical laboratories are interested in improving their ability to adjust to changes in their customers' requirements.

2. According to the results, it can be concluded that product innovation has a direct and substantial effect on supply chain performance, which means that increasing product innovation by technicians leads to a significant

improvement in supply chain performance for engineering offices and medical laboratories.

3. The results show an indirect effect of product innovation on the supply chain performance, which means that the technicians who represent the study sample are interested in making more efforts aimed at encouraging the culture of innovation and presenting new ideas about the products of engineering offices and medical laboratories that represent the study community.

4. The results showing that engineering offices and medical laboratories tend to take the lead in introducing



new products to the market, in addition to working continuously to develop new features for their products.

5. The research sample was keen to search for contemporary technologies provided by vendors as well as to observe the advances made available by competitors on the market.

6. The sample under study is aware of the importance of delivering goods that satisfy the customer's expectations, the ongoing effort to match their product specifications to approved quality standards, and the objective of establishing a competitive advantage by increasing the level of quality.

7. The interest of the technicians who represent the studied sample in improving their ability to respond to the needs of their customers by increasing the outlets for distributing products, which contributes to faster access to a larger number of customers.

8. The technicians who represent the study sample realized the importance the reduction of the costs of the resources involved in processing the products, and innovation in pricing their products and increasing the demand for them.

9. The study sample was mindful of the importance of improving their ability to rapidly adjust production operations' scheduling in response to any emergency and shorten the cycle of product development in order to deliver it to their customers at the designated time.

Recommendations

1. The study sample needs to understand how important it is to get customers to suggest unique ideas on their goods.

2. The engineering offices and medical laboratories that represent the study community should be interested in training and developing the skills of the technicians who work in it and keeping them abreast of the latest technologies and methods that encourage product innovation and attract the best workforce in the market.

3. The need for the studied population to understand the significance of investing extant organizational capabilities throughout its supply chain and forked thinking skills and changing them into innovative products.

4. The necessity of the engineering offices and medical laboratories to reduce the costs of transportation and storage and provide periodic control over the costs of products in an effort to increase demand for them.

5. The research sample must look for more contemporary ways to satisfy the needs of their consumers with their product delivery.

6. The necessity of the technicians who represent the study sample to support the decisions of bringing the latest technologies provided by suppliers in the field of product innovation by informing their departments of these modern technologies.

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