Uncertain Supply Chain Management 8 (2020) 897–910

Contents lists available at GrowingScience

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm

Total just in time and operational performance of local fast food restaurants

Abdel-Aziz Ahmad Sharabati[a*] and Shahad Ghazi Adel Al-Janabi[a]

[a]*Business Faculty, Middle East University, Amman, Jordan*

A B S T R A C T

The purpose of this research is to investigate the impact of total JIT practices (JIT purchasing, JIT operations, and JIT selling) on operational performance (quality, delivery, and cost) of local fast-food restaurants in Jordan. The study is quantitative and covers 43 out of 142 local fast-food restaurants in Amman. Data were collected by questionnaires from 101 managers and supervisors. After confirming normality, validity, reliability, and relationships between variables, multiple regressions were conducted to test the hypothesis. Results indicate that there are strong relationships among total JIT sub-variables, very strong relationships among operational performance dimensions, and a very strong relationship between JIT and operational performance. Finally, results show that total JIT practices have a positive significant effect on the operational performance of Jordanian local fast-food restaurants.

Article history:
Received December 1, 2020
Received in revised format December 18, 2020
Accepted December 18 2020
Available online December 18 2020

Keywords:
Total JIT Practices
JIT Purchasing
JIT Operations
JIT Selling
Operational Performance
Quality
Time
Delivery
Local Fast Food Restaurants

1. Introduction

Nowadays, due to globalization, customers are more aware of international markets, and they are more aware of their needs and requirements. Customers need quality products/services at a suitable cost and to be delivered at the right time. Accordingly, manufacturing or service organizations must match with the market needs to be able to survive and grow. They should develop their operations to improve performance and achieve a competitive advantage. In the 1970s, Taiichi Onho (Toyota director) had suggested and implemented Just in Time (JIT) to improve Toyota's operational performance to satisfy customer requirements. Since then, many organizations, especially manufacturing organizations used JIT to improve their performance, but recently many service organizations started implementing JIT to improve their operations to achieve a competitive advantage. JIT means getting the right product, in the right quantity, right place, at the right time, cost, and quality. Therefore, this research is directed to study the influence of total JIT (JIT purchasing, JIT Operations, and JIT selling) on the operational performance of local fast-food restaurants in Jordan. Markets are rapidly changing, and competition is increasing creating new challenges for all organizations, so organizations need to implement new tools such as JIT to minimize inventory, cost, and improve the delivery of their products to customers (Salehi, et al. 2010). Improving operational performance is the key to customer satisfaction, which is necessary to sustain business and improve financial performance (Santa *et al.,* 2014). The JIT approach helps organizations to improve their production process and reduce wastes (Sing and Ahuja, 2014). JIT helps organizations to better respond to customers' needs with minimal use of resources and people (Kinyua, 2015). JIT reduces non-added-value activities and inventories and leads to continuous improvement (Prajapati and Deshpande, 2015). JIT considers best practices related to processes, people, products/services, and the environment (Khaireddin *et al.,* 2015). JIT provides competitive advantages and increases the profitability of the manufacturing industry (Granberry *et al.,* 2015). Since the 1950s, JIT has been developed and employed by Japanese manufacturers such as Toyota,

* Corresponding author
E-mail address: APharmaArts@Gmail.Com (A.-A. A. Sharabati)

doi: 10.5267/j.uscm.2020.x.010

which means producing the required products in needed quantities at the right time (Åhlström, 2015). JIT production is a system that allows manufacturers to minimize the inventory and cost by delivering what is needed into the production processes (Reid, 2016). JIT manufacturing reduces inventory and lead-time, which improves manufacturers' competitiveness (Xu and Chen, 2016). JIT-pull system eliminates all types of production system wastes. The wastes include inventory costs, overproduction, inventory spaces, and inefficient products and materials flow (Azim, 2018). Toyota developed the Just-in-Time system to improve operations and reduce waste (Alkunsol *et al.,* 2018). Improving operational performance affects inventory, productivity, product quality, services quality, delivery, and costs (Sutrisno, 2019). JIT is seeking to improve processes performance to be more productive and to provide customers with the best products and services (Phan *et al.,* 2019). The maintenance department is under pressure to reduce waste and costs, so it uses JIT (Phogat & Gupta, 2019). Organizations are under constant pressure to improve their manufacturing performance to be able to compete in the current business environment (Bashar & Hasin, 2019). Nowadays, organizations are exposed to rapid innovation and increased competition that need to be more creative. Fast-changing situations require more operational flexibility (Al-Doori *et al.,* 2019). JIT is used throughout the supply chain, which consists of suppliers, manufacturers, and retailers where the inventory of raw materials and finished goods are involved (Biswas & Sarker, 2020). Green supply chain practices, JIT, and total quality management (TQM) are used to improve operational performance, competitive advantage, and business performance (Agyabeng-Mensah, 2020).

Finally, from the discussion above, we can conclude that JIT is successfully implemented in the manufacturing sector, which encourages the service sector to explore the effect of JIT practices on the performance of the service sector. Therefore, this research is dedicated to investigating the total JIT practices (JIT purchasing, JIT operations, and JIT selling) on Jordanian local fast-food restaurants' operational performance (quality, delivery, and cost). This research aims to provide sound recommendations to leaders and managers working in this industry on how to improve their organizations' operational performance.

2. Hypotheses Development

The competition among restaurants in Jordan and all over the world is escalating, especially among fast-food restaurants. In Jordan, the competition is not only among local fast-food restaurants but also between local fast-food restaurants and international fast-food restaurants, which offer quality food with good services at lower costs, so the branches of international fast-food restaurants are increasing, and their market share is also increasing more than local fast-food restaurants. Through observations and some unofficial interviews with many customers, they say that international fast-food restaurants provide quality meals at the right time at affordable prices. Only a very few researchers investigated why international fast-food restaurants grow faster than local fast-food restaurants, and many researchers recommended carrying out such research specially to explore how the local fast-food restaurants are trying to improve their operations by using JIT to satisfy their customers' needs. Due to competition, organizations are forced to update their methods and tools to create a competitive advantage and increase market share (Belekoukias *et al.*, 2014). To assess the success of JIT implementation, organizations need customers' evaluation of their products and services to be able to improve products' quality from customers' viewpoints (Singh *et al.,* 2014). Four key factors affect the JIT practices' effectiveness: education, communication, teamwork, and quality (Singh, and Ahuja, 2014). Top management support is the key to implement JIT and reshape the organization to satisfy customers' requirements (Tzempelikos, 2015). JIT is needed to improve both internal and external communication and cooperation, as well as encourage employees to leave their comfort zone (Jadhav *et al.,* 2015). JIT improves the communication process inside the organization (Bhushan *et al.,* 2017). Implementing JIT leads to the continuous improvement of all functions, and all employees, and improves the decision-making process (Chanda, 2017). JIT is implemented throughout the supply chain, which involves an inventory of raw materials and finished goods (Biswas and Sarker, 2020). Based on the above discussion we assume that local fast-food restaurants apply total JIT practices within their daily activities, therefore the first hypothesis developed to answer the following question: Do Jordanian local fast-food restaurants implement total JIT practices (JIT purchasing, JIT operation, and JIT selling) and operational performance (quality, delivery, and cost) components?

H_1: Jordanian local fast-food restaurants implement total JIT practices (JIT purchasing, JIT operation, and JIT selling) and operational performance (quality, delivery, and cost), at $\alpha \leq 0.05$

JIT implementation improves operational performance (Meybodi, 2010). Organizations use JIT practices to reduce inventory, improve quality, and lower costs (Salehi *et al.,* 2010). JIT operations positively affect efficiency and responsiveness, and it has a direct effect on operations' performance (Bortolotti *et al.,* 2013). JIT reduces purchasing lead-time, speeds the processes, improves quality, and reduces cost (Singh and Ahuja, 2014). JIT's effectiveness is evaluated through core competencies development, delivery, and operational performance (Meybodi, 2015). A full understanding of JIT and the relationship among its components is crucial for JIT implementation and success (Ezzahra *et al.,* 2018). JIT enhances operational performance and improves competitive position (Phan and Matsui, 2019). JIT improves operational performance, competitive advantage, and business performance (Agyabeng-Mensah, 2020). Based on the discussion above we assume that JIT positively affects operational performance, therefore, the second hypothesis is dedicated to investigating the influence of total JIT on improving the operational performance of the Jordanian local fast-food restaurants.

H_2: Total JIT practices (JIT purchasing, JIT operations, and JIT selling) influence the operational performance of Jordanian fast-food restaurants, at $\alpha \leq 0.05$.

3. Research Model

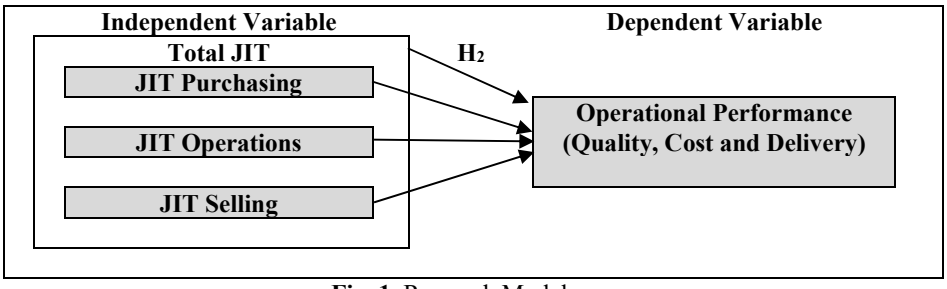

Fig. 1. Research Model

4. Literature Review

The literature review includes two sections, the first section highlights the definitions of total JIT and its components and operational performance and its dimensions. The second section summarizes the results of selected previous studies related to the relationship between total JIT practices and operational performance and is arranged based on the publication date from oldest to most recent.

4.1 Definitions of Variables

4.1.1 Total JIT Practices

JIT is a production philosophy that is expected to achieve the lowest inventory level (Chan *et al.,* 2010). JIT inventory and purchasing provide flexibility, which minimizes the inventory costs and improves the flexibility of volume and variety (Mazanai, 2012). JIT is a production concept that minimizes inventories by using a pull system where each component of this system pulls from the previous step to deliver quality (Kootanaee *et al.,* 2013). Toyota Corporation was the first that integrated all supply chain elements to eliminate wastes, increase productivity, and speed manufacturing processes (Zhao *et al.,* 2014). Implementing JIT needs to integrate whole supply chain elements (purchasing, operation, and selling) to improve performance (Green *et al.,* 2014). JIT is an efficient system to improve the supply chain, which reduces inventory, cost, and improves quality and performance (Dora *et al.,* 2014). JIT requires a good planning system and information sharing or communication between stakeholders (Xu & Chen, 2016). JIT is an approach or a system that uses planned and scheduled activities to reduce waste and gain a competitive advantage (Al-Haraisa, 2017). JIT is a system that links the suppliers and manufacturers together and forces them to work closely with each other to maximize the benefits for both (Bhushan *et al.,* 2017). JIT is a tool that improves production operation to enhance operational performance (Chanda, 2017). JIT scheduling reduces lot size and increases production agility by using common resources with suppliers and customers (Iqbal *et al.,* 2018). JIT activities facilitate communication among players, improve processes execution, and product quality (Phan *et al.,* 2019). Corporate culture, management commitment, and human resources management are crucial for JIT implementation, which enhances operational performance (Qamruzzaman & Karim, 2020). In summary, JIT practices include all processes and activities carried out by the organization from raw material to delivering products and services to end consumers; it includes JIT purchasing, JIT operations, and JIT selling.

JIT Purchasing

JIT purchasing helps to establish long-term arrangements and contracts with suppliers to facilitate cooperation (Mazanai, 2012). JIT purchasing is an approach for purchasing materials on needed time to satisfy actual demands with minimal waste, inventory, and cost (Singh & Ahuja, 2014). Implementing JIT purchasing needs careful inventory management otherwise may lead to stock-outs (Garcia-Alcaraz & Maldonada-Macia, 2016). JIT purchasing is used to reduce inventory, increase the mutual relationships between the organizations and the suppliers to improve the production processes, and reduce production waste (Phogat & Gupta, 2018). JIT Purchasing is a method used to develop trust, coordination, and collaboration between the organizations and the suppliers to improve quality, flexibility, and reduce cost (Pérez & Torres, 2019). In summary, JIT purchasing concerns about the relationship with suppliers to make material available in the right quantity, quality, place, time, and cost.

JIT Operation

In the 1970s, Toyota implemented JIT to reduce waste, inventory costs, and improve production operations (Bortolotti *et al.,* 2013). Later, Toyota has used JIT and Lean manufacturing to eliminate wastes and improve operations performance (Dora *et al.,* 2014). In McDonald's, JIT facilitates integration with suppliers, employee involvement, and standardized procedures

for all production processes. JIT operations lead to reduce waste, standardize procedures, save resources, and customer satisfaction (Nandini, 2014). JIT standardizes processes and encourages cooperation with suppliers to ensure that customers receive the order on time with the same quality (Patel *et al.,* 2016). JIT's operation core is to eliminate wastes in processes to improve system efficiency by providing quality products at the lowest cost possible and according to customers' needs (Chanda, 2017). JIT operations facilitate examining the restaurant's processes to reduce defects and improve operations (Phogat and Gupta, 2018). Three factors affect the success of JIT implementation: continuous improvement, employee involvement, and management support, these lead to increased efficiency and improved performance (Ganiyu *et al.,* 2019). In summary, JIT operations concern internal cooperation and coordination to eliminate wastes, standardize procedures, and smooth the material flow, which aims to improve operational performance.

JIT Selling

JIT selling in restaurants includes processes integration, performance control, strategic and marketing decentralization (Naor *et al.,* 2008). JIT selling integrates whole processes to enhance performance, it is an approach to reduce waste and improve delivery (Green *et al.,* 2011). JIT purchasing and selling increase supply chain efficiency and flexibility to improve operational performance and product quality (Gurahoo & Salisbury, 2018). In summary, JIT sells concerns about the relationship with customers and includes delivering consistent product quality to satisfy customers' needs. It fulfills promises and provides the customer with what exactly is required.

4.1.2 Operational Performance

Operational performance can be described as the functions, mechanisms, and stages that harmonize the practices with the strategy, it provides a comprehensive detailing view about processes, people, and financial needs to perform specific tasks and activities, and provides information about budgets, production quantities, and work schedules (Taticchi *et al.*, 2010). Operational performance is measured by productivity, profitability, and efficiency (Pekuri *et al.,* 2011). Key operational performance indicators are new product development, quality, and customer satisfaction (Gabčanová, 2012). Operational performance is about how to use resources to achieve an organization's goals (Santa *et al.*, 2014). Operational performance goals are the areas of performance that the company tries to improve to achieve the company's strategy (Kaviani & Abbasi, 2014). Operational performance includes criteria and standards for measuring the organizational operations performance to satisfy customers' demands (Hwang *et al.,* 2014). Financial indicators are not sufficient to measure operational performance because there are many other factors to evaluate (Şengül *et al.*, 2015). Performance can be defined as a set of specific outcomes for activities (Abazeed, 2017). Operational performance can be measured by the following competitive priorities: delivery speed, quality, flexibility, and cost (Bagher, 2018). In the current study, the operational performance is evaluated by using the following indicators quality, cost, and delivery.

Quality

Quality is considered as one of the primary competitive priorities and competitive advantages. It means maintaining constant quality levels to satisfy customer requirements (Truong *et al.*, 2014). Restaurants should concentrate on process quality because the poor quality in any step affects all steps and produces low-quality products or services; so, continuous improvement should not stop (Singh *et al.,* 2014). Quality is producing products that meet or exceed the needs, desires, and expectations of customers related to product quantity, which is the most important factor for success (Silva & Ferreira, 2017). In summary, quality is meeting or exceeding customer's expectations about the product or service.

Cost

Reducing cost does not always guarantee profitability and success; there are many other challenges to consider such as quality (Santa *et al.,* 2010). Organizations must focus on all cost centers to lower production and marketing costs than competitors. Operations management aims to reduce production costs compared with competitors to create competitive prices and enhance the competitive advantage (Şengül *et al.,* 2015). In summary, cost includes all fixed and variable costs, which affect product or service price. Cost including inventory cost, lead-time cost, set-up cost, internal operations cost, delivery cost, and so many other costs incurred by the organization.

Delivery

Delivery performance indicates the supply chain's success level in providing products and services to the customers (Rao *et al.,* 2011). On-time delivery indicates the organization's ability to deliver according to plans and schedules to customers. Some organizations base their competition on delivering reliability and timing only (Rasi *et al.,* 2015). Organizations that can provide a shorter delivery time may increase their market shares (Kinyua, 2015). Delivery is a non-financial measure to provide products and services in time, which creates customer satisfaction and loyalty. Constant fast service delivery sustains a competitive advantage over competitors (Paul *et al.,* 2017). Delivery is the process that links between the inside and outside organizations (Kong *et al.,* 2018). Delivery plays a key role in the competition between organizations in the markets and focuses on fast products and services presented to customers (Santos *et al*., 2019). In summary, delivery includes

responsiveness, flexibility, and reliability of providing products and services. Also, it includes the timing and fulfilling promises of delivery.

5. Previous Studies

Many previous studies investigated the relationship between the JIT system and organizations' operational performance and concluded that all organizations, whether they provide products or services can get the benefit from JIT. For example, Furlan *et al. (*2011) collected data from manufacturing managers from nine countries. Results showed that it is very important to correlate upstream and downstream activities to maximize the organizations' operational performance. Green *et al. (*2014) collected data from plant managers. Results indicated that the total JIT (JIT purchasing, JIT selling, JIT operation, and JIT information) and supply chain affect organizational performance. Belekoukias *et al. (*2014) collected data from 140 manufacturing organizations around the world. The results showed that JIT and automation have a high effect on operational performance (quality, speed, dependability, flexibility, and cost). Khaireddin *et al. (*2015) collected data from 92 directors and supervisors. Results indicated that JIT practices strongly affect operational performance (time, cost, and flexibility). Chen's (2015) collected data from 137 Chinese companies. The results indicated that there is a strong relationship between JIT and TQM with operations performance. Aoki and Mouer (2015) stated that in the 1950s Taiichi Ono implemented JIT production in Toyota Motor Company, which was suggested in 1938 by Kiichiro Toyoda and developed by Sakichi Toyoda. Toyota's production system includes JIT, and automation, and uses a highly developed supplier network. Ford used JIT production to develop the Ford production system to facilitate the transition from mass production to small lot sizes, which reduces inventory and cost. JIT means selecting the right suppliers to provide material to the production line at the right time and amount. Granberry *et al. (*2015) concluded that Bose Corporation has used the JIT II system to cover the gap between supplier and customer to improve visibility, communications, increase production efficiency, and final delivery. Åhlström (2015) JIT uses continuous improvement, customer pull production, reduces setup, and eliminates all types of waste. Li (2015) concluded that implementing a JIT system improves healthcare operations. It increases the throughput rate, speeds up healthcare processes, reduces costs, and improves the quality of hospital services. Haq *et al. (*2016) collected data from 380 participants. Results indicated that JIT effectiveness improves operational performance. Patel *et al. (*2016) indicated that JIT improves production related to quantity, quality, and reduces waste and time. Reid (2016) concluded that JIT production minimizes the inventory and cost by delivering what is needed into the production process, therefore, the JIT system improves efficiency and effectiveness of operations. Xu and Chen (2016) indicated that JIT manufacturing reduces inventory and lead-time, which improves manufacturers' competitiveness.

Moreover, Hadli (2017) collected data from 100 managers working at Malaysian manufacturing companies. The results showed that JIT supply chain practices affect operational performance and there is a strong relationship between supplier management, customer focus, and operational performance. Gunarathne and Kumarasiri (2017) collected data from 30 textile and apparel companies registered in Sri Lanka. The results indicated that JIT eliminates waste, which directly affects operational performance. Barkhordari and Denavi (2017) collected data from 219 managers. The findings revealed that the total JIT supports the supply chain and improves operational performance. Panwar *et al.* (2018) collected data from 500 production managers in Indian process industries. The results showed that lean practices including JIT improved productivity, delivery time, reduced waste, defect, inventory, and cost. Rasit *et al. (*2018) collected data from Malaysian companies. Results revealed that the organizations use the JIT system to improve performance. Kamarudin and Abdul Mahid (2018) collected data from 265 Malaysian manufacturing organizations. The results showed that JIT affected supply chain performance. Ramlawati (2018) collected data from 40 managers working at manufacturing companies in the Makassar Industrial area. The results showed that the JIT system influenced competitive advantage and operational performance. Azim (2018) findings indicated that the JIT-pull system reduces inventory, inventory costs, inventory spaces, and improves production communications. Yadav *et al. (*2019) collected data from 425 managers working in 15 SMEs in India. The results showed that lean practices including JIT positively affected operational performance. Ganiyu *et al. (*2019) results showed that JIT reduced cost by 9.4 and increased returns on investment by 16.3%, so it affects the financial performance of manufacturing companies in Nigeria. Phogat and Gupta (2019) collected data from 133 manufacturing organizations in India. Results showed that maintenance reduced inventory, processing waste including reworks, rejects, transport, and motion waste. Bashar and Hasin (2019) collected data from 227 Apparel Companies. The results showed that JIT positively affects organizational performance. Agyabeng-Mensah (2020) collected data from 140 managers working at manufacturing organizations in Ghana. The findings indicated that the synergy between the green supply chain, JIT, and TQM directly affects operational performance and business performance. Biswas and Sarker (2020) collected data from one organization by observations to follow JIT delivery of multiple products to satisfy customers' needs. JIT has been used to optimize operations facilities to find the optimum number of orders and shipments. JIT reduced lead-time, production quantities, and minimized the cost. Qamruzzaman and Karim (2020) collected data from 410 manufacturing companies. Results showed that corporate culture, management commitment, human resources management affect JIT implementation, which in turn affect operational performance.

Finally, in Jordan Al Maani (2016) collected data from 55 employees working in Jordanian public manufacturing companies. Results indicated that the Jordanian public industrial companies do not apply the JIT production system effectively due to a lack of top management awareness, and experience. Abu Zaid *et al. (*2016) collected data from 166 industrial companies in

Jordan. Results showed that JIT purchasing and selling directly affect operational performance, while JIT operation indirectly affects operational performance through JIT selling. Al Haraisa (2017) collected data from 168 managers working in 14 Jordanian manufacturing companies. The results showed that the JIT elements positively influence the operational excellence of Jordanian industrial companies. Al-Doori *et al. (*2019) collected data from 318 managers working in hospitals in Jordan. Results indicated that JIT, TQM, and SCM influence operational flexibility.

In conclusion, most of the previous studies were carried out on the manufacturing industry but not on the service industry and indicated that JIT improves the operational performance of almost all organizations implementing JIT, therefore, why not test the JIT effect on the service industry especially the fast-food industry. Therefore, this study is directed to investigate the relationship between total JIT practices and operational performance.

6. Research Methodology

6.1 Research Design

This research is considered quantitative research, it uses a descriptive and cause/effect approach to investigate the effect of total JIT (JIT purchasing, JIT selling, and JIT operation) on operational performance (quality, cost, and delivery) of Jordanian local fast-food restaurants. Previous studies have been used to build the questionnaire and a panel of judges validate it. Then data were collected, checked, and coded against SPSS. After confirming normality, validity, reliability, and the correlation between variables, multiple regressions have been used to test the hypotheses.

Research Population, Sample, and Unit of Analysis

According to the Amman Chamber of Commerce, there are 142 local fast-food restaurants in Amman, Jordan. Data were collected by a questionnaire from 101 managers and supervisors working at 43 local fast-food restaurants. The research uses a manager and supervisor as a unit of analysis.

Data Collection Methods (Tools)

Data were collected from two sources: secondary and primary data. Secondary data were collected from previous research, studies, articles, papers, dissertations, thesis, journals, and the internet. Primary data were collected by a questionnaire, which was developed by using previous literature and a panel of judges. The questionnaire includes two parts as follows: The first part includes total JIT as an independent variable containing JIT purchasing, JIT operation, JIT selling (Bortolotti *et al.,* 2013; Wakchaure *et al.,* 2014). The second part includes operational performance as a dependent variable contains quality, cost, and delivery (Huo, 2012; Chen, 2015). Each sub-variable and dimension is measured by six questions. A five-point Likert-type scale was used to measure implementation of all sub-variables and dimensions items ranging from value 1 (strongly not implemented) to value 5 (strongly implemented).

Validity and Reliability Tests: Three methods have been used to confirm validity, content validity, face validity, and construct validity. For content validity, multiple sources of literature have been used such as previous research, papers, studies, articles, thesis, dissertations, journals, and worldwide Websites. The panel of the judge has been used to confirm face validity. To confirm construct validity Principal Component Factor Analysis with Kaiser Meyer Olkin (KMO) has been used, which examines data explanation and conformity. Factor loading over 0.50 is good and over 0.40 is accepted (Hair *et al.,* 2014). However, Kaiser Meyer Olkin (KMO) indicates sampling harmony, adequacy, and inter-relationships, KMO between 0.8 and 1 indicates high adequacy while over 0.6 is accepted. Bartlett's of Sphericity is used for data suitability and correlation, where a significant value less than 0.05 at 95% confidence level indicates that factor analysis is useful. The percentage of variance shows the explanation power of the factor (Cerny & Kaiser, 1977). Finally, reliability is confirmed by using Cronbach's alpha, Cronbach's alpha of more than 0.60 is accepted (Hair *et al.,* 2014).

Table 1 shows that factor loading for all items is more than 0.50 indicates a good fit of each item within its group, and KMO for all sub-variable and dimensions is more than 0.80 which indicates good harmony among items, variance percentage is more than 55 for all sub-variables and dimensions indicates good explanatory power of each sub-variables and dimensions. Finally, the mean, standard deviation, t-value, and its significance less than 0.05 indicate that Jordanian local fast-food restaurants are implementing both variables total JIT and its sub-variables, as well as operational performance and its dimensions. Therefore, the first hypothesis (**H_1**) is accepted, which states that Jordanian local fast-food restaurants implement total JIT practices (JIT purchasing, JIT operation, and JIT selling) and operational performance (quality, delivery, and cost), at $\alpha \leq 0.05$). JIT selling rated the highest implementation, followed by JIT operations, finally JIT purchasing. Delivery rated the highest implementation, followed by quality, finally cost. These results show that the local fast-food restaurants as a service industry concerns about JIT selling and delivery more than other sub-variable and dimensions.

Table 1
Descriptive, Reliability, and Validity Tests

Item	M.	S.D.	t	Sig	Alpha	F1	KMO	Chi²	B.T.	Var.	Sig.
JITP1	3.81	.80	10.24	0.00		0.769					
JITP2	3.82	.65	12.63	0.00		0.654					
JITP3	4.05	.80	13.11	0.00	0.824	0.806	0.808	244.673	15	55.456	0.000
JITP4	3.99	.99	10.00	0.00		0.778					
JITP5	4.00	.79	12.76	0.00		0.886					
JITP6	3.78	.955	8.23	0.00		0.518					
JITP	**3.91**	**.61**	**14.97**	**0.00**							
JITO1	4.16	.89	13.06	0.00		0.813					
JITO2	4.14	.89	12.79	0.00		0.876					
JITO3	3.89	1.17	7.63	0.00	0.857	0.832	0.858	269.450	15	59.745	0.00
JITO4	3.90	.90	10.06	0.00		0.702					
JITO5	3.93	.93	10.06	0.00		0.741					
JITO6	4.19	1.11	10.16	0.00		0.649					
JITO	**4.02**	**.76**	**13.61**	**0.00**							
JITS1	4.16	.80	14.61	0.00		0.873					
JITS2	4.09	.93	11.79	0.00		0.812					
JITS3	4.43	.73	19.74	0.00	0.920	0.931	0.890	446.596	15	72.910	0.00
JITS4	4.27	.73	17.37	0.00		0.811					
JITS5	4.34	.60	22.22	0.00		0.840					
JITS6	4.27	.77	16.47	0.00		0.850					
JITS	**4.26**	**.65**	**19.49**	**0.00**							
Qu1	4.24	.78	16.09	0.00		0.829					
Qu2	4.18	.73	16.30	0.00		0.705					
Qu3	3.78	.96	8.23	0.00	0.876	0.682	0.852	319.586	15	63.083	0.00
Qu4	4.17	.89	13.17	0.00		0.773					
Qu5	4.14	.89	12.79	0.00		0.892					
Qu6	3.90	1.18	7.68	0.00		0.861					
Quality	**4.12**	**.73**	**15.35**	**0.00**							
Co1	3.90	.90	10.06	0.00		0.669					
Co2	3.96	.94	10.30	0.00		0.759					
Co3	4.14	1.11	10.27	0.00	0.892	0.815	0.864	374.501	15	67.138	0.00
Co4	4.17	.80	14.66	0.00		0.898					
Co5	4.11	.93	12.03	0.00		0.873					
Co6	4.44	.73	19.85	0.00		0.878					
Cost	**4.07**	**.72**	**14.90**	**0.00**							
De1	4.28	.74	22.36	0.00		0.834					
De2	4.36	.61	16.54	0.00		0.852					
De3	4.28	.78	16.08	0.00	0.859	0.859	0.876	313.624	15	61.338	0.00
De4	4.25	.78	16.34	0.00		0.899					
De5	4.19	.73	10.39	0.00		0.814					
De6	3.60	.58	22.36	0.00		0.823					
Delivery	**4.16**	**.54**	**21.49**	**0.00**							
Variable	**M.**	**S.D.**	**t**	**Sig**	**Alpha**	**F1**	**KMO**	**Chi²**	**B.T.**	**Var.**	**Sig.**
JIT P	3.91	.61	14.97	0.00		0.736					
JIT O	4.02	.76	13.61	0.00	0.925	0.919	0.885	1253.024	153	46.696	0.00
JIT S	4.26	.65	19.49	0.00		0.902					
JIT	**4.06**	**.58**	**18.53**	**0.00**							
Cost	4.07	.72	14.90	0.00		0.943					
Quality	4.12	.73	15.35	0.00	0.950	0.944	0.707	777.427	153	71.046	0.00
Delivery	4.16	.54	21.49	0.00		0.929					
OP	**4.12**	**.62**	**17.94**	**0.00**							

T-tabulated value=1.980

6.2 Relationships between Variables

Bivariate Pearson correlation has been used to check the relationships among sub-variables and dimensions, as well as, between main variables. Table 2 shows that the relationships among total JIT sub-variables are strong, where r ranges between 0.462 and 0.834, and the relationships among operational performance dimensions are very strong, where r ranges between 0.818 and 0.826. Finally, the relationship between total JIT and operational performance is very strong, where r equals 0.949.

Table 2
Bivariate Pearson Correlation (r) Matrix between JIT and Operational Performance

	Variable	1	2	3	4	5	6	7	8
1	JIT Purchasing								
2	JIT Operation	0.479**							
3	JIT Selling	0.462**	0.834**						
4	Total JIT	0.736**	0.919**	0.902**					
5	Quality	0.547**	0.940**	0.817**	0.910**				
6	Cost	0.449**	0.907**	0.920**	0.900**	0.818**			
7	Delivery	0.492**	0.773**	0.913**	0.854**	0.826**	0.826**		
8	Operational Performance	0.528**	0.939**	0.938**	0.949**	0.943**	0.944**	0.929**	

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

6.3 Hypothesis Testing

After confirming validity, reliability, and relationships between variables, the following tests should be confirmed before carrying out multiple regressions: normality, linearity, and independence of errors, multi-collinearity (Sekaran, 2003; Hair *et al.,* 2014). Normal Distribution (Histogram): Fig. 2 shows that the data are normality distributed, so the residuals do not affect the normal distribution.

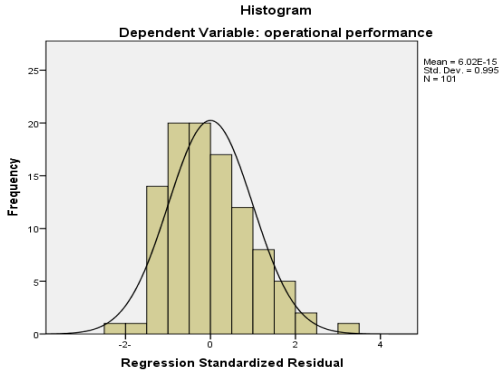

Fig. 2. Normality Test

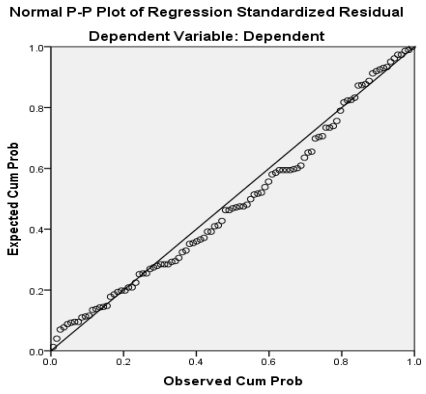

Fig. 3. Linearity Test

Linearity Test: Fig. 3 shows that there is a linear relationship between independent and dependent variables.

Independence of Errors: Fig. 4 shows that the errors are independent of each other, and the residuals are scattered and not correlated to each other.

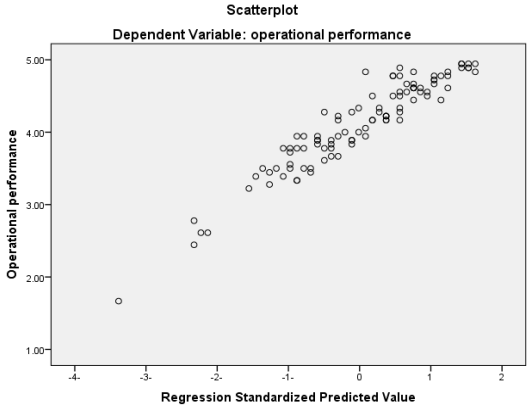

Fig. 4. Scatter plot

Multi-Collinearity: VIF (Variance Inflation Factor) and tolerance are used to test multicollinearity. If VIF is less than 10 and tolerance is more than 10%, then the multicollinearity assumption is not violated. Table 3 shows that the VIF values are less than 10 and the tolerance values are more than 10%.

Table 3
Multi-collinearity and Durbin-Watson Tests

Sub-Variables	Collinearity Statistics	
	Tolerance	VIF
JIT Purchasing	0.758	1.320
JIT Operations	0.294	3.402
JIT Selling	0.300	3.335

Main Hypothesis:

H_2: Total JIT practices (JIT purchasing, JIT operations, and JIT selling) influence the operational performance of Jordanian fast-food restaurants, at $\alpha \leq 0.05$.

Table 4 shows that when regressing the three total JIT sub-variables together against operational performance, the model is fit, where (f=852.53, sig.=0.000). It also shows that total JIT can explain 96% of operational performance variation, where (R2=0.963, F=852.53, Sig.=0.000). Therefore, the second hypothesis (**H_2**) is accepted which states that total JIT practices (JIT purchasing, JIT operations, and JIT selling) influence the operational performance of Jordanian fast-food restaurants, at $\alpha \leq 0.05$.

Table 4
Results of Multiple Regressions Analysis of JIT Sub-variables against Operational Performance

Model	r	R^2	Adjusted R^2	f	Sig.
1	0.982[a]	0.963	0.962	852.53	0.000

a. Dependent Variable: Operational Performance

Table 5 shows the results of regressing the three total JIT sub-variable on operational performance.

Table 5
Results of Multiple Regressions Analysis (ANOVA) of JIT Sub-variables against Operational Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.188	0.093		2.009	0.047
	JIT Purchasing	0.063	0.023	0.062	2.760	0.007
	JIT Operation	0.412	0.030	0.498	13.910	0.000
	JIT Selling	0.476	0.034	0.494	13.939	0.000

a. Predictors: (Constant) JIT Selling, JIT Purchasing, JIT Operations, b. Dependent Variable: Operational Performance, T-tabulated value=1.980

Table 5 shows that JIT operations have the highest effect on operational performance, where (β=0.498, t=13.910, sig.=0.000), followed by JIT selling, where (β=0.494, t=13.939, sig.=0.000), finally, JIT purchasing, where (β=0.062, t=2.760, sig.=0.007). This indicates that Jordanian local fast-food restaurants believe that JIT operations and JIT selling highly affect operational performance compared to JIT purchasing.

7. Results Discussion

Results of the study indicate that Jordanian local fast-food restaurants are implementing both variables JIT and its sub-variables, as well as operational performance and its dimensions. JIT selling rated the highest implementation, followed by JIT operations, finally JIT purchasing. Delivery rated the highest implementation, followed by quality, finally cost. These results show that the Jordanian local fast-food restaurants as a service industry concerns about JIT selling and delivery more than other sub-variable and dimensions. Therefore, the first hypothesis (H1) is accepted, which states that Jordanian local fast-food restaurants implement JIT practices (JIT purchasing, JIT operation, and JIT selling) and operational performance (quality, delivery, and cost). These results are matching with most previous studies such as organizations needing to implement JIT to minimize inventory and improve the delivery of their products to customers (Salehi et al., 2010). In the 1970s, Toyota implemented JIT to reduce waste, inventory costs, and improve production operations (Bortolotti et al., 2013). To assess the success of JIT implementation, organizations need customers' evaluation of their products and services to improve products' quality from customers' viewpoints (Singh et al., 2014). Implementing JIT needs to integrate whole supply chain elements (JIT purchasing, JIT operation, and JIT selling) to improve performance (Green et al., 2014). Top management support is the key to implementing JIT and reshaping the organization to satisfy customers' requirements (Tzempelikos, 2015), and encourage employees to leave their comfort zone (Jadhav et al., 2015). Implementing JIT purchasing needs careful inventory management otherwise may lead to stock-outs (Garcia-Alcaraz & Maldonada-Macia, 2016). Implementing JIT leads to the continuous improvement of all functions, and all employees, and improves the decision-making process (Chanda, 2017). Three factors affect the success of JIT implementation: continuous improvement, employee involvement, and management support, these lead to increased efficiency and improved performance (Ganiyu et al., 2019). JIT has been used to optimize operations facilities to find the optimum number of orders and shipments (Biswas & Sarker, 2020). Finally, Jordanian public industrial companies do not apply the JIT production system effectively due to a lack of top management awareness, and experience (Al Maani, 2016).

Moreover, results show that the relationships among JIT sub-variables are strong, the relationships among operational performance dimensions are very strong, and the relationship between JIT and operational performance is very strong too. These results are in line with previous studies such as it is very important to correlate upstream and downstream activities to maximize the organizations' operational performance (Furlan *et al.,* 2011). There is a strong relationship between JIT supplier management, customer focus, and operational performance (Hadli, 2017). A full understanding of JIT and the relationship among its components is crucial for JIT implementation and success (Ezzahra *et al.,* 2018).

Finally, results show that there is a positive significant effect of total JIT on operational performance, so, the second hypothesis (**H_2**) is accepted which states that total JIT practices (JIT purchasing, JIT operations, and JIT selling) influence

the operational performance of Jordanian fast-food restaurants. JIT operations were having the highest effect on operational performance, followed by JIT selling, finally, JIT purchasing. Results are matching with previous studies such as Green *et al. (*2014) indicated that the total JIT (JIT purchasing, JIT selling, JIT operation, and JIT information) and supply chain affect organizational performance. Belekoukias *et al. (*2014) showed that JIT and automation have the highest effect on operational performance (quality, speed, dependability, flexibility, and cost). Khaireddin *et al. (*2015) indicated that JIT practices strongly affect operational performance (time, cost, and flexibility). Chen (2015) indicated that there is a strong relationship between JIT and TQM and operations performance. Haq *et al.* (2016) mentioned that JIT effectiveness improves operational performance. Abu Zaid *et al. (*2016) showed that JIT purchasing and selling directly affect operational performance, while JIT operation indirectly affects operational performance through JIT selling. Patel *et al. (*2016) results indicated that JIT improves production related to quantity, quality, time, and reduces waste and time. Hadli (2017) showed that JIT supply chain practices affect operational performance. Gunarathne and Kumarasiri (2017) indicated that JIT eliminated the waste, which directly affects operational performance. Al Haraisa (2017) showed that JIT elements positively influence the operational excellence of Jordanian industrial companies. Barkhordari and Denavi (2017) findings revealed that the total JIT supports the supply chain and improves operational performance. Panwar *et al. (*2018) showed that lean practices including JIT improved productivity, delivery time, reduced waste, defect, inventory, and cost. Rasit *et al. (*2018) revealed that organizations use the JIT system to improve performance. Kamarudin and Abdul Mahid (2018) showed that JIT affected supply chain performance. Yadav *et al. (*2019) showed that lean practices positively affected operational performance. Yadav *et al. (*2019) showed that lean practices including JIT positively affected operational performance. Ganiyu *et al. (*2019) showed that JIT affects the financial performance of manufacturing companies in Nigeria. Phogat and Gupta (2019) showed that maintenance reduced inventory, processing waste including reworks, rejects, transport, and motion waste in manufacturing organizations in India. Bashar and Hasin (2019) showed that JIT positively affects the organizational performance of Apparel Companies. Agyabeng-Mensah (2020) indicated that the synergy between the green supply chain, JIT, and TQM directly affects the operational performance and business performance of manufacturing organizations in Ghana. Biswas and Sarker (2020) indicated that JIT reduced lead-time, production quantities, and minimized the cost. Qamruzzaman and Karim (2020) showed that corporate culture, management commitment, human resources management affect JIT implementation, which in turn affect the operational performance of manufacturing companies. Finally, in Jordan, Abu Zaid *et al. (*2016) showed that JIT purchasing and selling directly affect operational performance, while JIT operation indirectly affects operational performance through JIT selling. Al Haraisa (2017) showed that JIT elements positively influence the operational excellence of Jordanian industrial companies. Al-Doori *et al. (*2019) indicated that JIT, TQM, and SCM influence the operational flexibility of Jordanian hospitals.

8. Conclusion

Nowadays, Jordanian organizations in general and service organizations in specific are competing to improve their operations by using different tools. In the case of fast food, the competition is not only among local fast-food restaurants but the race is also with international fast-food restaurants. Accordingly, Jordanian local fast-food restaurants are using total JIT to improve their operational performance. Therefore, this study is dedicated to investigating the effect of using total JIT on the operational performance of Jordanian local fast-food restaurants. The results of this study indicate that Jordanian local fast-food restaurants are implementing total JIT practices where JIT selling rated the highest implementation, followed by JIT operations, finally JIT purchasing. Jordanian local fast-food restaurants are also implementing operational performance dimensions, where delivery rated the highest implementation, followed by quality, finally cost. Moreover, the results indicate that there are strong relationships among JIT sub-variables and very strong relationships among operational performance dimensions, which indicate that improving any sub-variable or dimension affects other sub-variable and dimensions, therefore it is better to work on all sub-variables and dimensions together. Furthermore, the results show that there is a very strong relationship between total JIT and operational performance, so any improvement in total JIT will immediately influence operational performance. Finally, results show that there is a positive significant effect of total JIT practices (JIT purchasing, JIT operations, and JIT selling) on the operational performance of Jordanian fast-food restaurants, where JIT operations were having the highest effect on operational performance, followed by JIT selling, finally, JIT purchasing. This means that capitalizing the efforts on total JIT will improve competitive advantage through enhancing operational performance. I think this is important to note that Jordanian fast-food restaurants JIT selling and service delivery more than other sub-variables and dimensions, also they believe that JIT operations and JIT selling affect operational performance more than JIT purchasing do. This is logical for the service industry and shows the differences between the manufacturing industry and the service industry; the manufacturing industry is based on material and product more than service, while the service industry capitalizes its effort on service more than tangible products.

9. Limitations and Recommendations

This research is conducted on the local fast-food restaurants in Amman, Jordan. Generalizing the results of this research to other industries and/or countries is questionable. Therefore, it is recommended to conduct such research on other industries in Jordan and other countries especially Arab countries because they have a similar culture. It is also recommended to test the effect of total JIT on other operational performance dimensions.

10. Practical Implications

Managers of local fast-food restaurants should use modern tools such as JIT and Lean to eliminate waste, reduce inventory, and improve operations to enhance quality, deliverability, and reduce cost. They have to provide training courses on JIT practices and how to allocate resources accordingly.

11. Social Implications

Using JIT and Lean systems will reduce inventory and eliminate wastes, which affects quality and cost and consequently improves corporate social responsibility, which helps in economic development and social welfare.

12. Originality/Value

Most of the previous studies were conducted on the manufacturing industry, while this study is dedicated to the service industry, therefore according to the author's knowledge, this research is the first study, which investigated the effect of total JIT on operational performance in local fast-food restaurants in Jordan, as a service industry.

References

Abazeed, R. (2017). Benchmarking culture and its impact on operational performance: a field study on industrial companies in Jordan. *International Journal of Academic Research in Economics and Management Sciences*, *6*(1), 162-177. http://dx.doi.org/10.6007/IJAREMS/v6-i1/2608

Abu Zaid, M.K.S.A., Migdadi, M.M., Alhammad, F.A., & Al-Hyari, K.A. (2016). An empirical examination of total just-in-time impact on operational performance: insights from a developing country. *International Journal of Supply Chain and Inventory Management*, *1*(4), 286-305. https://doi.org/10.1504/IJSCIM.2016.081819.

Agyabeng-Mensah, Y., Afum, E., Agnikpe, C., Cai, J., Ahenkorah, E., & Dacosta, E. (2020). Exploring the mediating influences of total quality management and just in time between green supply chain practices and performance. *Journal of Manufacturing Technology Management*, ahead-of-print No. ahead-of-print. https://doi.org/10.1108/JMTM-03-2020-0086

Åhlström, P. (2015). Just-in-Time, *Wiley Encyclopedia of Management*, pp. 1-3. https://doi.org/10.1002/9781118785317.weom100184

Al Haraisa, Y.E. (2017). Just-In-Time system and its impact on operational excellence: An empirical study on Jordanian industrial companies. *International Journal of Business and Management*, *12*(12), 158-167.

Al-Doori, J.A., Alhorani, A., & Areiqat, A.Y. (2019). The Role of Just in Time, Total Quality Management, and Supply Chain Management toward Better Operational Performance. *The Journal of Social Sciences Research*, *5*(4), 949-956.

Al-Maani, A. (2016). JIT in the Jordanian Industrial Companies.*International Journal of Academic Research in Accounting, Finance and Management Sciences*, *6*(3), 31-36.

Aoki, K., & Mouer, R. (2015). Just-in-Time Production. *The Wiley Blackwell Encyclopedia of Consumption and Consumer Studies*, 1-2. https://doi.org/10.1002/9781118989463.wbeccs154

Azim, A.K. (2018). Just-In-Time (JIT)-Pull System Approach on A Malaysia Rubber Production Company. *International Journal of Advances in Scientific Research and Engineering (IJASRE),* 4(8), 139-146. DOI: http://doi.org/10.31695/IJASRE.2018.32784

Bagher, A. (2018). The effect of supply chain capabilities on performance of food companies. *Journal of Financial Marketing, 2*(4), 1-9.

Barkhordari, R., & Denavi, H. (2017). Just-In-Time (JIT) Manufacturing and its Effect on the Competence of Supply Chain and Organizational Performance in the Tile and Ceramic Industry in Yazd Province. *Specialty Journal of Knowledge Management*, *2*(1), 8-19.

Bashar, A., & Hasin, A.A. (2019). Impact of JIT Production on Organizational Performance in the Apparel Industry in Bangladesh. In *Proceedings of the 2019 International Conference on Management Science and Industrial Engineering,* 184-189. https://doi.org/10.1145/3335550.3335578

Belekoukias, I., Garza-Reyes, J.A., & Kumar, V. (2014). The impact of lean methods and tools on the operational performance of manufacturing organisations. *International Journal of Production Research*, *52(*18), 5346-5366. https://doi.org/10.1080/00207543.2014.903348

Bhushan, U., Aserkar, R., Kumar, K.N., & Seetharaman, A. (2017). Effectiveness of Just In Time Manufacturing Practices. *International Journal of Business Management and Economic Research (IJBMER)*, *8(*6), 1109-1114.

Biswas, P., & Sarker, B. (2020). Operational planning of supply chains in a production and distribution center with just-in-time delivery. *Journal of Industrial Engineering and Management*, *13*(2), 332-351. DOI: http://dx.doi.org/10.3926/jiem.3046

Bortolotti, T., Danese, P., & Romano, P. (2013). Assessing the impact of just-in-time on operational performance at varying degrees of repetitiveness. *International Journal of Production Research*, *51*(4), 1117-1130. https://doi.org/10.1080/00207543.2012.678403

Cerny, B., & Kaiser, H. (1977). A study of a measure of sampling adequacy for factor-analytic correlation matrices. *Multivariate behavioral research, 12*(1), 43-47.

Chan, H.K., Yin, S., & Chan, F.T. (2010). Implementing just-in-time philosophy to reverse logistics systems: a review. *International Journal of Production Research, 48*(21), 6293-6313. https://doi.org/10.1080/00207540903225213

Chanda, M.D. (2017). The study of the relationship between Kaizen practices and operations' performance improvement in Zambian manufacturing companies*. The International Journal of Multi-Disciplinary Research,* 119, 1-14.

Chen, Z. (2015). The relationships among JIT, TQM and production operations performance: An empirical study from Chinese manufacturing firms.*Business Process Management Journal,* 21(5), 1015-1039. https://doi.org/10.1108/BPMJ-09-2014-0084

Dora, M., Van D., Kumar, M., Molnar, A., & Gellynck, X. (2014). Application of lean practices in small and medium-sized food enterprises. *British Food Journal, 116*(1), 125-141. https://doi.org/10.1108/BFJ-05-2012-0107

Ezzahra, S.F., Ahmed, A., & Said, R. (2018). Literature review on successful JIT implementation in developing countries: obstacles and critical success factors. In *2018 International Colloquium on Logistics and Supply Chain Management (LOGISTIQUA)*, 63-68. IEEE. DOI: 10.1109/LOGISTIQUA.2018.8428268.

Furlan, A., Dal Pont, G., & Vinelli, A. (2011). On the complementarity between internal and external just-in-time bundles to build and sustain high-performance manufacturing. *International Journal of Production Economics, 133*(2), 489-495. https://doi.org/10.1016/j.ijpe.2010.07.043

Gabčanová, I. (2012). Human resources key performance indicators. *Journal of competitiveness*, *4*(1), 117-128. https://doi.org/10.7441/joc.2012.01.09

Ganiyu, A.B., Henry, A.W. and Adekunle, A.M. (2019). An assessment of just in time system on the financial performance of manufacturing firms in Nigeria. *Journal of Accounting and Taxation*, *11*(7), 111-119. https://doi.org/10.5897/JAT2018.0323

García-Alcaraz, J.L. and Maldonado-Macías, A.A. (2016). Concepts of Just-in-Time (JIT). In *Just-in-Time Elements and Benefits*, 3-20. Springer, Cham. https://doi.org/10.1007/978-3-319-25919-2_1

Granberry, J., Raisinghani, M.S. and Arora, A. (2015). Competing in a Global Marketplace: Just-in-Time in the Value Chain, *Wiley Encyclopedia of Management*, 1-5. https://doi.org/10.1002/9781118785317.weom060217

Green Jr, K.W., Inman, R., Birou, L.M. and Whitten, D. (2014). Total JIT (T-JIT) and its impact on supply chain competency and organizational performance. *International Journal of Production Economics*, *147*, 125-135. https://doi.org/10.1016/j.ijpe.2013.08.026

Green, K.W., Inman, R.A. and Birou, L.M. (2011). Impact of JIT-selling strategy on organizational structure. *Industrial Management & Data Systems, 111*(1), 63-83. https://doi.org/10.1108/02635571111099730

Gunarathne, G.C.I. and Kumarasiri, W.D.C.K.T. (2017). Impact of Lean Utilization on Operational Performance: A Study of Sri Lankan Textile and Apparel Industry. *Vidyodaya Journal of Management, 3*(1), 27-41.

Gurahoo, N. and Salisbury, R.H. (2018). Lean and agile in small-and medium-sized enterprises: Complementary or incompatible? *South African Journal of Business Management*, *49*(1), 1-9. DOI: 10.4102/sajbm.v49i1.11.

Hadli, H. (2017). The Determinants of Firm Operational Performance. *Available at SSRN 2988730*. http://dx.doi.org/10.2139/ssrn.2988730

Hair, Jr, J., Sarstedt, M., Hopkins, L. and G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. *European Business Review,* 26(2), 106-121. DOI 10.1108/EBR-10-2013-0128

Haq, M.A., Khan, N.R., Parkash, R. and Jabeen, A. (2016). Impact of JIT, Waste Minimization, and Flow Management on Operational Performance of Manufacturing Companies. *Calitatea*, *17*(153), 48-58.

Huo, B. (2012). The impact of supply chain integration on company performance: an organizational capability perspective. *Supply Chain Management*, *17*(6), 596-610. https://doi.org/10.1108/13598541211269210

Hwang, G., Han, S., Jun, S., & Park, J. (2014). Operational Performance Metrics in Manufacturing Process: Based on SCOR Model and RFID Technology. *International Journal of Innovation, Management, and Technology, 5*(1), 50-55. DOI: 10.7763/IJIMT.2014.V5.485

Iqbal, T., Huq, F., & Bhutta, M.K.S. (2018). Agile manufacturing relationship building with TQM, JIT, and firm performance: An exploratory study in apparel export industry of Pakistan. *International Journal of Production Economics*, *203*, 24-37. https://doi.org/10.1016/j.ijpe.2018.05.033

Jadhav, J.R., Mantha, S.S., & Rane, S.B. (2015). Analysis of interactions among the barriers to JIT production: interpretive structural modelling approach, *Journal of Industrial Engineering International*, *11*(3), 331-352. https://doi.org/10.1007/s40092-014-0092-4

Kamarudin, N., & Abdul Majid, I. (2018). The Moderating Effect of JIT on the Relationship between SCOR Models on Supply Chain Performance in Malaysia Manufacturing Industry. *Journal of Information System and Technology Management*, *3*(10), 34-46.

Kaviani, M.A., & Abbasi, M. (2014). Analyzing the Operations Strategies of Manufacturing Firms Using a Hybrid Grey DEA approach â A case of Fars Cement Companies in Iran. *International Journal of Supply and Operations Management*, *1*(3), 371-391.

Khaireddin, M., Assab, M.I.A., & Nawafleh, S.A. (2015). Just-In-Time manufacturing practices and strategic performance: An empirical study applied on Jordanian pharmaceutical industries. *International Journal of Statistics and Systems*, *10*(2), 287-307.

Kinyua, B.K. (2015). An assessment of just in time procurement system on organization performance: A case study of corn products Kenya limited. *European Journal of Business and Social Sciences*, *4*(5), 40-53.

Kong, L., Li, H., Luo, H., Ding, L., & Zhang, X. (2018). Sustainable performance of just-in-time (JIT) management in time-dependent batch delivery scheduling of precast construction. *Journal of cleaner production*, *193*, 684-701. https://doi.org/10.1016/j.jclepro.2018.05.037

Kootanaee, A.J, Babu, K.N., & Talari, H. (2013). Just-In-Time Manufacturing System: From Introduction to Implement. *International Journal of Economics, Business, and Finance,* 1(2), 7-25. *Available at SSRN 2253243*. http://dx.doi.org/10.2139/ssrn.2253243.

Alkunsol, W.H., Sharabati, A.A., AlSalhi, N.A., & El-Tamimi, H.S. (2018). Lean Six Sigma effect on Jordanian pharmaceutical industry's performance. *International Journal of Lean Six Sigma*, https://doi.org/10.1108/IJLSS-01-2017-0003

Li, J. (2015). Just-in-Time Management in Healthcare Operations. *Mahurin Honors College Capstone Experience/Thesis Projects,* Paper 530. https://digitalcommons.wku.edu/stu_hon_theses/530.

Mazanai, M. (2012). Impact of just-in-time (JIT) inventory system on efficiency, quality, and flexibility among manufacturing sector, small and medium enterprise (SMEs) in South Africa. *African Journal of Business Management*, *6*(17), 5786-5791. https://doi.org/10.5897/AJBM12.148

Meybodi, M.Z. (2010). The impact of just-in-time practices on consistency of benchmarking performance measures. *Journal of Competitiveness Studies*, *18*(1/2), 73-88.

Meybodi, M.Z. (2015). The links between just-in-time practices and alignment of benchmarking performance measures. *The TQM Journal*, 27(1), 108-121. https://doi.org/10.1108/TQM-08-2013-0098

Nandini, A.S. (2014). McDonald's Success Story in India. *Journal of Contemporary Research in Management*, *9*(3), 21-31.

Naor, M., Goldstein, S.M., Linderman, K.W. and Schroeder, R.G. (2008). The role of culture as driver of quality management and performance: infrastructure versus core quality practices. *Decision Sciences*, *39*(4), 671-702. https://doi.org/10.1111/j.1540-5915.2008.00208.x

Panwar, A., Jain, R., Rathore, A.P.S., Nepal, B., & Lyons, A.C. (2018). The impact of lean practices on operational performance–an empirical investigation of Indian process industries. *Production Planning & Control*, *29*(2), 158-169. https://doi.org/10.1080/09537287.2017.1397788

Patel, K., Patel, K., & Sanap, R. (2016). Implementation of Just-In-Time in an Enterprise. *International Journal of Advance Research, Ideas, and Innovations in Technology*, *2*(6), 1-5.

Paul, R., Bose, R.J.C., Chalup, S.K., & Raravi, G. (2017). Improving Operational Performance in Service Delivery Organizations by Using a Metaheuristic Task Allocation Algorithm. In *BPM (Industry Track)* (pp. 25-37).

Pekuri, A., Haapasalo, H., & Herrala, M. (2011). Productivity and performance management–managerial practices in the construction industry. *International Journal of Performance Measurement*, *1*(1), 39-58.

Perez, F., & Torres, F. (2019). An integrated production-inventory model for deteriorating items to evaluate JIT purchasing alliances. *International Journal of Industrial Engineering Computations*, *10*(1), 51-66. DOI: 10.5267/j.ijiec.2018.5.001

Phan, A.C., Nguyen, H.T., Nguyen, H.A., & Matsui, Y. (2019). Effect of total quality management practices and JIT production practices on flexibility performance: Empirical evidence from international manufacturing plants. *Sustainability*, *11*(11), 3093. https://doi.org/10.3390/su11113093

Phogat, S., & Gupta, A.K. (2019). Expected maintenance waste reduction benefits after implementation of Just in Time (JIT) philosophy in maintenance (a statistical analysis). *Journal of Quality in Maintenance Engineering*, *25*(1), 25-40. https://doi.org/10.1108/JQME-03-

Phogat, S., & Gupta, A.K. (2018). Theoretical analysis of JIT elements for implementation in the maintenance sector of Indian industries. *International Journal of Productivity and Quality Management*, *25*(2), 212-224. https://doi.org/10.1504/IJPQM.2018.094765

Prajapati, M.R., & Deshpande, V. (2015). Cycle time reduction using lean principles and techniques: A review. *International Journal of Advance Industrial Engineering, 3*(4), 208-213.

Qamruzzaman, M.D., & Karim, S. (2020). Corporate culture, management commitment, and HRM effect on operation performance: The mediating role of just-in-time. *Cogent Business & Management*, *7*(1), 1-26. 1786316. https://doi.org/10.1080/23311975.2020.1786316

Ramlawati, R. (2018). Just in time and competitive advantage: understanding their linkages and impact on operational performance. *Archives of Business Research*, *6*(8), 189-204. https://doi.org/10.14738/abr.68.5041

Rao, M.C., Rao, P.K., & Muniswamy, V.V. (2011). Delivery performance measurement in an integrated supply chain management: case study in batteries manufacturing firm. *Serbian Journal of Management*, *6*(2), 205-220.

Rasi, R.Z.R., Rakiman, U.S., & Ahmad, M.F.B. (2015). Relationship between lean production and operational performance in the manufacturing industry. In *IOP conference series: Materials science and engineering, 83*(1), 1-11. IOP Publishing. doi:10.1088/1757-899X/83/1/012016

Rasit, Z.A., Satar, N.H.A., & Ramli, A. (2018). Effect of JIT on Organisational Performance: Influence of Performance Measurement System. *Journal of Engineering and Applied Sciences*, *13*(8), 2108-2113.

Reid, N. (2016). *Just-In-Time Production System, International Encyclopedia of Geography: People, the Earth, Environment, and Technology: People, the Earth. Environment and Technology*, 1-4. https://doi.org/10.1002/9781118786352.wbieg0275

Salehi, M., Alipour, M., & Ramazani, M. (2010). Impact of JIT on firms' financial performance: some Iranian evidence. *Global Journal of Management and Business Research*, *10*(4), 21-29. Available at SSRN: https://ssrn.com/abstract=2199971

Santa, R., Hyland, P., & Ferrer, M. (2014). Technological innovation and operational effectiveness: their role in achieving performance improvements. *Production Planning & Control*, *25*(12), 969-979. https://doi.org/10.1080/09537287.2013.785613

Santa, R., Vemuri, R., Ferrer, M., Bretherton, P., & Hyland, P. (2010). Understanding the impact of strategic alignment on the operational performance of post implemented technological innovations. In *Proceedings of the 11th International CINet Conference: Practicing Innovation in the Times of Discontinuity*, 902-916). CINet.

Santos, H., Lannelongue, G., & Gonzalez-Benito, J. (2019). Integrating green practices into operational performance: evidence from Brazilian manufacturers. *Sustainability*, *11*(10), 2956. https://doi.org/10.3390/su11102956

Sekaran, U. (2003). *Research methods for business: A skill-building approach, student edition.* John Wiley & Sons, Singapore.

Şengül, M., Alpkan, L., & Eren, E. (2015). Effect of globalization on the operational performance: A survey on SMEs in the Turkish electric Industry. *International business research*, *8*(7), 57-67. http://dx.doi.org/10.5539/ibr.v8n7p57

Silva, A.A., & Ferreira, F.C. (2017). Uncertainty, flexibility, and operational performance of companies: modelling from the perspective of managers. *RAM. Revista de Administração Mackenzie*, *18*(4), 11-38. https://doi.org/10.1590/1678-69712017/administracao.v18n4p11-38

Singh, G., & Singh Ahuja, I. (2014). An evaluation of just in time (JIT) implementation on manufacturing performance in Indian industry. *Journal of Asia Business Studies*, *8*(3), 278-294. https://doi.org/10.1108/JABS-09-2013-0051

Sutrisno, T.F. (2019). Relationship Between Total Quality Management Element, Operational Performance, and Organizational Performance In Food Production SMEs. *Jurnal Aplikasi Manajemen*, *17*(2), 285-294. http://dx.doi.org/10.21776/ub.jam.2019.017.02.11

Taticchi, P., Tonelli, F., & Cagnazzo, L. (2010). Performance measurement and management: a literature review and a research agenda. *Measuring Business Excellence*, *14*(1), 4-18. https://doi.org/10.1108/13683041011027418

Truong, H., Sampaio, P., Carvalho, M., Fernandes, A. and An, D. (2014). The role of quality management practices in operational performance: an empirical study in a transitional economy. *In 1st International Conference on Quality Engineering and Management, 717-733.* http://hdl.handle.net/1822/36227

Tzempelikos, N. (2015). Top management commitment and involvement and their link to key account management effectiveness. *Journal of Business & Industrial Marketing, 30*(1), 32-44. https://doi.org/10.1108/JBIM-12-2012-0238

Wakchaure, V.D., Nandurkar, K. N. and Kallurkar, S.P. (2014). Relationship between implementation of TQM, JIT, TPM and SCM and manufacturing performance: Empirical Evidences from Indian Context. In *International Manufacturing Science and Engineering Conference* (MSEC2014-4034, V001T04A033; 10 pages). American Society of Mechanical Engineers. https://doi.org/10.1115/MSEC2014-4034

Xu, Y. and Chen, M. (2016). Improving Just-in-Time manufacturing operations by using Internet of Things based solutions. *Procedia CIRP*, *56*, 326-331. https://doi.org/10.1016/j.procir.2016.10.030

Yadav, V., Jain, R., Mittal, M.L., Panwar, A. and Lyons, A. (2019). The impact of lean practices on the operational performance of SMEs in India. *Industrial Management & Data Systems*, 119(2), 317-330. https://doi.org/10.1108/IMDS-02-2018-0088

Zhao, W., Yu, Q.Q., Li, H.S. and Tian, Y.Z. (2014). Study on the relationship between JIT practices and operational performance based on the cost leading strategy. In *2014 International Conference on Management Science & Engineering 21th Annual Conference Proceedings* (pp. 329-334). IEEE. DOI: 10.1109/ICMSE.2014.6930248.