The Impact of Supply Chain Management Approaches on Supply Chain Performance in Iraq

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Abstract— Indeed due to globalization and changing regional powers, supply chain (SC) has become an essential element. It is evident that political, social and economic changes over the few past decades become supply chain more uncertain and complex. The economy of Iraq is dominated by Oil that is contributing 95% in its foreign exchange. Meanwhile War has destroyed its major infrastructure still supply is moving on but with more uncertainty. Although, War destroy the economy badly however there are numerous ways to reduce the uncertainty that will improve the performance; supply chain management (SCM) approaches cannot be neglected. Whereas, supply chain management approaches have determined the performance in various industries and in various regions. The aim of this study to explore the potential benefits of supply chain management approaches toward attaining supply chain performance. This is an empirical investigation conducting among members of oil and gas supply chain in Iraq. Data were collected form 260 members of supply chain that include drilling, processing, distribution areas of Iraq. Factor analysis and multiple regressions through SPSS have been used for data analysis. The finding of this study reveals that all three supply chain management approaches information sharing (IS), joint decision making (JDM) and risk and reward sharing (RRS) positively and significantly affect the supply chain performance. This article contribute to the literature by proposing and testing the influence of IS, JDM and RRS.

Keywords— supply chain management, supply chain collaboration, supply chain performance

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1. Introduction

Iraq is third largest oil producing country in the world with 143.1 billion barrels of reserves and getting 95% of its foreign exchange by exporting oil [1]. Obviously it demand high level of coordination in supply chain as Supply chain is flow of good, information and finance. During last few decades Iraq is suffering with War, this brings Iraq in top 10 risky countries [2]. Although US have imposed new rules and regulations and country is going toward improvement particularly oil sector however still country need some major stability [3]. By adopting better supply chain approaches effectively and efficiently Iraq can retrieve its position.

Performance measure is an indicator that establishes how well an organization accomplishes its goals; it may include market orientation, customer satisfaction, financial performance or etc. previous performance has been measure in numerous methods like firm performance, operational performance, and financial performance. However, it has been established that competition is no more among organizations but among supply chain. Thus to compete globally, it is essential to include all members and performance should be measured on supply chain level. An organization with better supply chain can keep the business smooth, efficient and effective [4]. In order to achieve efficiency and effectiveness managers must establish a completive supply chain approaches, there are various approaches to that positively affect the performance, the most effective is considered is supply chain collaboration [5].

Subsequently, in order to achieve collaboration partners of supply chain must need to share information and enhance knowledge with suppliers, customers, and other partners of supply chain, so that they continues with quicker decision-making, less inventory, shorter lead times high flexibility, supplier performance, more customer satisfaction and etc. [6]. Nevertheless, all the types of information cannot be shared at all the time and some decisions demand details so joint decision making has become an essential approach [7]. Trust is an essential element for intra-organizational relationship. Meanwhile, organizations need to establish long term relationship for trust building[3]. Thus best approach to build long and trusted relationship is share their risks and rewards.

Conclusively, after realizing Iraq economic situation and present development in oil sector, it can be conclude that effective supply chain is essential. However to make the supply chain effective, efficient and achieve best supply chain performance supply chain collaboration need to be more improved. This study has empirically verified three supply chain collaboration approaches namely, information sharing, joint decision making and risk and reward sharing and revealed that all three approaches have positive and significant effect of supply chain performance.

2 Literature review

Supply chain has been regarded with several definitions by researches. Previous it was viewed as logistic and its functions were only flow of good for one point to another. With the passage of time researchers and academicians add value like, inventory management, promotions, marketing or even new product development. According to [8] “Supply Chain Management is management of material, money, men, and information within and across the supply chain to maximize customer satisfaction and to get an edge over competitors”. Supply chain also includes suppliers, customers, logistic provider and other members so first this it deals not only supply but also demand and other sides and secondly it is not a simple chain but has become a complex network [9]. Thus for better understanding it is essential to understand all member of supply chain that have either indirect or indirect effects of performance.

2.1 Supply chain performance

The aim of every organization is to improve the performance but for improvement they must need to measure it accurately first [10]. Various studies has presented numerous frameworks, models and metrics and huge literature is available on measuring performance in supply chain still a commonly accepted metric is not available [9], [11]. Previously performance was measured by cost with the passage of time more financial indicator were added like return on asset, return on investment, sale and etc. [12]. Only financial indicators are not enough for measure overall and accurate performance, consequently, with the invent of balance scorecard approach some operational indicators were add [13]. Other approaches also added values in measuring supply chain like quantitative or qualitative measures, strategic, tactical and operational measures and etc. [14]. A comprehensive review and revealed that for the good performance measure all the members should be considered, performance measure should consider both financial and non-financial items, all the levels of supply chain must be considered and all process of supply chain should be included so the performance should be measured by supply chain performance [15].

Multiple indicators and metrics have been used for measuring supply chain performance based on various models, frameworks, and approaches [16]. SCM had been measured by operational performance and its indicators were quality performance, flexibility performance, customer service, delivery performance and cost performance [17], [18]. Ref. [6] has use logistic effect for SCM and its metric consisted on order fill rate, order fulfilment lead time, operations flexibility, inventory turnover and total logistics cost. SCM has been measured SCM with organizational performance and its dimension was profit, cost, ROI and sale [19]. It can be conclude that SCM performance had been measured by various ways like operational, organizational, firm, financial measures. A model has been developed for measuring performance and revealed that for measuring overall performance, these items should be

considered cost, quality, flexibility, customer satisfaction, capacity, time, consistency [15]. Thus, this study will consider all the requirement of better supply chain performance. Table 1 describes the items for supply chain performance measurements.

Table 1: Dimensions for supply chain performance

Order fill rate	Percentage of orders completed in full within the planned order lead time.	[20]
Order fulfilment lead time	The lead time from customer order origination to customer order receipt.	
Operations flexibility	Ability to meet production modification.	
Inventory turnover	How many times a year the average inventory for a firm changes over.	
Total logistics cost	Overall, costs involving logistics activities	
Quality	Better product/service quality	[21]
Customer satisfaction	Customer satisfaction level	

It is the rea of technology, globalization, organizations must be flexible and responsive in rapid changing situations. Hence organizations cannot gain superior performance until they are internally as well as externally perform well. Now competition is not among organization but among supply chain [15], [22]. If an organization wants to competition it must focus on internally and externally [4]. Various approaches and practices had been proposed for performance improvement in supply chain.

2.2 Supply chain management approaches

SCM approaches has been defined in various ways like according to [4] “SCM approaches are used to achieve organizations short term and long term goals such as to enhance productivity, control inventory, reduce waste, increase market share and sustain growth”. After measuring the performance now there is a question; how to improve it? Literature on SCM has proposed and verified number of approaches and strategies that have positive effect on performance like just in time, lean/agile/hybrid, integration, flexibility and supply chain collaboration. However, due to globalization it is hard for an organization to sustain alone, supply chain collaboration has become an essential part of business practices nowadays [23].

Several dimensions had been proposed for SCM approaches in literature. Ref. [24] has explored SC integration, SC design and IS and revealed that none of the approach affected flexibility performance and only SC design affected resource performance and output performance. Ref. [25] had develop and verified five dimensions that are long range relationships, information sharing, leveraging the internet, advanced planning techniques and supply and distribution network structures and found a positive relationship with organizational performance. In addition Ref. [26] has investigated SCM approaches by customer and supplier and relationships, postponement, agreed goals and vision, level and quality of IS and reward/risk sharing. This study found that all has positive relationship except customer relationship. Another study investigates internal integration, customer integration and supplier integration and found that customer integration did not significant positive impact of performance. Thus many studies have been conducted on SCM approaches that have revealed positive effect of performance. According to [27] information sharing, joint decision making (JDM) and teamwork are the major dimensions of SCM approaches. By review the literature it can be conclude that information sharing, joint decision making and risk and reward sharing are most important approaches and additionally these approaches have also empirically verified in many countries and many industry.

2.2.1 Information sharing (IS)

IS defined as “the willingness to make strategic and tactical data such as inventory levels, forecasts, sales promotion, strategies, and marketing strategies available to firms forming supply chain nodes” [7] . The ability to see from one side of the channel to last is crucial, information is assumed as blood for SC collaboration[28]. The aim of IS is to improve the efficiency and effectiveness in the whole network of organizations and finally enhance not only the firm performance but also the supply chain performance [29]. IS may also include logistic, customer, quality, time, market changes, design or uncertainty [30], [31]. IS has been investigates in multiple industries

and regions and revealed that it has a major contribution in enhancing supply chain performance [3], [6]. IS positively affects performance in many ways like enhanced service levels, customer responsiveness, decreased costs, and reduced levels of complexity [32].

Ref. [33] has studies IS with supplies, customers and internal in Chines manufacturing and revealed that all have positive effect on supply chain performance and internal IS also has a positive relationship with external IS. IS has a positive effect on supply chain performance but not significantly in manufacturing sector of Turkey [24]. Today supply chain has become more fragile and risks have become a serious concern. Ref. [34] did a comprehensive literature review and found that IS has not only positive effect on performance but also a good tool for reducing uncertainty. Based on the literature review below hypothesis has been developed.

H1: Information sharing has a positive effect on supply chain performance.

2.2.2 Joint decision making (JDM)

JDM defined as the "process by which supply chain partners coordinate activities in supply chain planning and operations for optimizing the supply chain benefits [7] it include plans, combine information, resolve problems and develop rules and regulation and procedures. An effective strategic coalition and worthy relationship with customers and suppliers is required and It should consists on trust, loyalty and positive relationship [4]. The aim of JDM is to align partners and to synchronize decisions on order placement, inventory replenishment and order delivery [34]. Meanwhile, every partner has its own objectives and goals, so it is sometime very hard to come on mutual points that may cause uncertainty [17], to reduce this uncertainty JDM has become an important strategy for today business.

Furthermore it has also empirically verified that JDM has positive effect on supply chain performance [6], [20], [21]. [35] JDM has a positive relationship with operational performance when quality of information is high. Meanwhile, [6] revealed that JDM with suppliers and customers improves logistic efficiency. JDM at strategic, tactical and operational level improves magnitude of relationship quality, strength and closeness that ultimately enhance supply chain performance [36]. Hence, based on literature review following hypothesis has been drawn.

H1: Joint decision making has a positive effect on supply chain performance.

2.2.3 Risk and reward sharing (RRS)

RRS has become essential aspects that insist organization [37]. RRS has become more essential as a result of growing global market and the evolving complexity of the supply chain [38]. RRS is a particular degree of relationship among chain members that result in higher business performance than would be achieved by the firms individually [39] to share risks, costs and rewards a particular degree of relationship among chain members is required, that can be achieved by coordinating various supply chain activities towards mutually determined goals. Beside previous two approaches, JDM has also been confirmed that it has positive significant effect on supply chain performance.

A balance between risk and reward develop close relationship among organizations that ultimately reduce uncertainty and enhance performance [9], [15], [18], [31], [37]. The aim of RRS is to develop common goals and objectives, so organization will take care of each other [39]. Consequently, RRS has found significant positive relationship with supply chain performance and this relationship have also been verifies empirically [26], [39]. Finally, based of empirical verification following hypothesis has been developed.

H1: Risk and reward sharing has a positive effect on supply chain performance.

2.3 Research Framework

After comprehensive literature a proposed framework has been developed. Figure 1 shows the proposed conceptual framework that consists of three independent variables, information sharing, joint decision making and risk and reward sharing, and a dependent variable supply chain performance. Based

on literature all three independent variables have positive relationship.

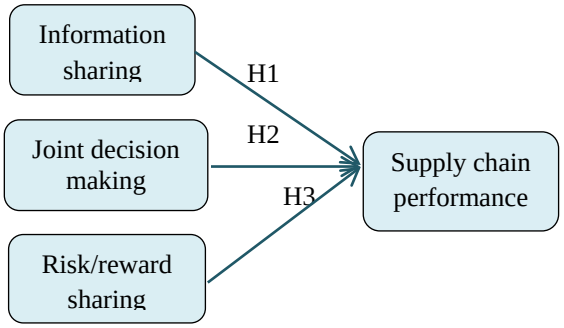

Figure 1: The research model

3 Methodologies

3.1 Sampling and Data Collection

The target of population in this study consists of Iraq Oil Companies. Information sharing, joint decision making and risk/reward sharing are independent variables whole supply chain performance is a dependent variable. The samples of this study are members of oil companies including drilling, processing, distribution areas of Iraq. Data were collected through questionnaires. The questionnaires were distributed to the members through self-administered surveys and the email. The sample size was 260 due to limited time and economic restraints. In this study there are 238 male and 22 female members are participated. In this study, the age of participant was between 25 to 60 years. In Figure 2 show the respondent age with respect to gender wise. In this study, the qualification of all members of respondent was MS level.

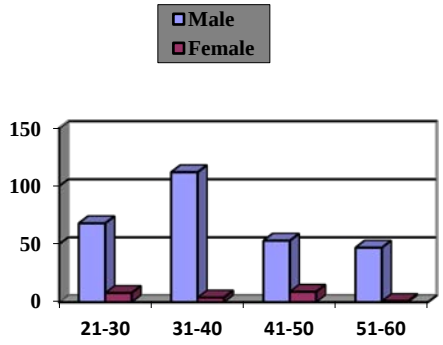

Figure 2 Respondents age with respect to gender wise

3.2 Data Presentation and Statistical Analysis

Data transfer into SPSS 23 version and variables are also checked and modified to minimize error of any risk in the final results. The further relationship between dependent variables and independent variable was analyzed by using Pearson's Correlation. Cronbach's α-coefficient was applied to evaluate the reliability of the measurement scales. The descriptive analysis of data is shown in table 1. Table 1 presents the value of mean and standard deviations. For the independent variables, information sharing yield the highest mean is 3.868, joint decision making mean is 3.906, Risk sharing mean is 4.162 and at the last, Supply chain performance mean is 4.643.

Table 1 Cronbach's σ coefficient, means and standard deviations

Variable	Cronbach's	Mean	SD
Information Sharing	.786	3.868	.519
Joint Decision Making	.723	3.906	.408
Risk/Reward Sharing	.785	4.162	.524
Supply Chain Performance	.717	4.643	.446

3.3 Analysis of Correlation and Regression

Pearson correlation was conducted to determine the relationship between supply chain management and supply chain performance. Analysis of correlation shows that it was significant correlation between supply chain management and supply chain performance. The correlations indicate the value of information sharing is .679** and P<.005, which show significant relationship between information sharing and supply chain performance which is most important elements of Oil industry in Iraq. Correlation of joint stock making is .648** and P<.005 indicates positive relationship among members of Oil industry in Iraq. The value of

correlation coefficient of risk sharing is .663** and P<.005 which ensure the link among risk sharing and supply chain performance which shown in table 2.

Furthermore, regression analysis in Table 3 indicates the relationship among independent and dependent variable. Regression analysis shows the all dimension of supply chain management (information sharing, joint decision making and risk sharing) plays a significant role and have an important and positive impact on the overall performance of supply chain in oil industry Iraq. Information sharing, joint decision making and risk sharing regressed against supply chain performance and the variance accounted for, $R^2(.580)$, $R^2(.516)$, $R^2(.397)$, respectively and these figures show that *(58 %)* of sharing information, *(51.6%)* of joint decision making and *(39.7%)* of risk sharing can be increased performance of oil industry in Iraq.

Table 2: Correlation analysis

Variable	IS	JDM	P/RS	SCP
Information Sharing	1			
Joint Decision Making	.419**	1		
Risk/Reward Sharing	.567**	.525**	1	
Supply Chain Performance	.679**	.648**	.663**	1

Table 3: Regression analysis

Variable	β	R	R^2	P
Information Sharing	.678	.539	.580	.000
Joint Decision Making	.559	.595	.516	.000
Risk/Reward Sharing	.623	.614	.397	.000

Dependent variable: (Supply Chain Performance)

3.4 Hypothesis Testing and Result

The significant of all the independent variable was found P<0.05, which is 0.000. The result shows the variables of information sharing, joint decision making and risk sharing jointly explain of the variance (R2) of supply chain management. Beta coefficient values indicate about the contribution of individual predictor in the model. The beta for information sharing is 0.678. This mean when one unit increase in information sharing, the overall performance of supply chain will increases by 0.678. The significant was found between joint decision making and supply chain performance, and indicates about beta value .559 which shows the relationship between them. The beta of risk sharing is .623 which mean when one unit increase due to risk sharing with members, then overall performance of supply chain will increases by 0.623. There is a significant relationship between these three variables of information sharing, joint decision making and risk sharing with supply chain management hence proved that H1, H2 and H3 are accepted.

4 Discussions and Conclusion

4.1 Discussion

This study focus on the relationship between information sharing, joint decision making, risk and reward sharing and supply chain performance in the context of supply chain management in Oil industry, Iraq. The findings of the study indicate that these independent variable like information sharing, joint decision making and risk sharing positively influences on supply chain performance. These outcomes are reliable with extant supply chain management literature [6], [40]. This study suggests that implementation of supply chain performance among oil industry in Iraq is also an important predictor of supply chain management similar to other developed countries. Researchers can use finding of this study to produce idea for further studies, and supply chain managers are able to identify specific supply chain performance that have the higher prospective to increase performance of oil industry.

In this study, we propose that information sharing, joint decision making and risk sharing are the relevant factors and suggest that supply chain performance is the most important one. The measurement instrument provided as a result of this

study is useful for researchers who are interested in conducting survey-based research associated to supply chain performance measures in any sector. This study also provides empirical explanation that identifies positive and important relationship among supply chain management and supply chain performance within the context of oil industry in Iraq. Thus, managers looking for proficiency and efficiency improvements should consider a set of supply chain management that could help them to expand their supply chain abilities and in turn their performance.

Supply chains consist of all associated activities, from raw material flows to good transformations. Management of the performance of supply chain activities in order to increase supply chain associations and good advantage is an important [9], [15], [18], [31]. The supply chain management provided in this study can be suitable for managers to evaluate to their current performance of oil industry in Iraq. Industry strongly interested in developing good performance and should develop innovative strategies. There is scope to enhance this study by taking different industries and increasing the number of respondents into consideration.

4.2 Limitation

Although the level best was tried to make the study as faultless as possible, however this study is not without limitations. Most significant limitations of the study are that due to time limits, data was only gathered from the oil industry in Iraq, which makes the generalization of the outcomes difficult. Another limitation of the research may be that, although the study was based on a time lagged design, information was gathered using convenience testing technique. Study into the research participants revealed the majority of the participants were quite young (ages from 21 to 40 years), working in oil industry in Iraq.

5. Conclusion

This study was conducted to understand how supply chain management contributes to supply chain performance. The current study enhance the supply chain performance literature through the information sharing, joint decision making and risk sharing. The evidence of this study influence directly information sharing, joint decision making, risk and reward sharing proved that these variables have key role toward performance of supply chain members of oil industry. This study shows the impact of three supply chain management approaches, information sharing, joint decision making and risk sharing with supply chain performance. In doing so it introduces a theoretical perspective of potential deployment of supply chain management as a means to achieve supply chain performance. Overall, this study provides further awareness into the developing field of the relationships among supply chain management and performance measures. While the research has made significant contributions to research and practice, it also contributes the empirically perspective of potential deployment of supply chain performance as a mean to achieve the industry aim and objectives.

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Appendixes

Information Sharing Source [40]

- Our firm and supply chain partners exchange relevant information.
- Our firm and supply chain partners exchange timely information.
- Our firm and supply chain partners exchange accurate information.
- Our firm and supply chain partners exchange complete information.
- Our firm and supply chain partners exchange confidential information.

Joint Decision Making Source [40]

- Our firm and supply chain partners jointly plan on promotional events.
- Our firm and supply chain partners jointly develop demand forecasts.
- Our firm and supply chain partners jointly manage inventory.
- Our firm and supply chain partners jointly plan on product assortment.
- Our firm and supply chain partners jointly work out solutions.

Risk and Reward Sharing Source [41]

- Supply chain members share risks and rewards.
- Supply chain members share research and development costs and results with each other.
- Supply chain members help each other financial capital investment.