OPEN ACCESS

Saudi Journal of Medical and Pharmaceutical Sciences
Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) | ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article **Health Services**

Identifying Critical Success Factors for implementing Effective Supply Chain Management Practices in Prince Sultan Medical City in Riyadh

Mohammed Saeed Alanazi[1*]

[1]Pharmacist, Health Services Dirocorate, Ministry of Defence Riyadh, Saudi Arabia

DOI: 10.36348/sjmps.2022.v08i11.005 | **Received:** 28.09.2022 | **Accepted:** 07.11.2022 | **Published:** 10.11.2022

***Corresponding author:** Mohammed Saeed Alanazi
Pharmacist, Health Services Dirocorate, Ministry of Defence Riyadh, Saudi Arabia

Abstract

Inefficient and ineffective SCM in hospitals result in many consequences that may affect the quality of health services that are provided to patients. The implementation of an effective SCM practices required the existence of a set of factors that help and facilitate the successful implementation processes. These factors are known as Critical Success Factors (CSFs).This study aimed to identify the existed CSFs for effective SCM implementation in PSMC. The study population was all supply department's staffs and supply representatives from other departments who are involved in the SCM practices in (PSMC). A questionnaire was developed and distributed to collect data from the target population. The results showed that the existed CSFs included information sharing (63.9%). training and education on SCM activities (62%), communication (62%), organizational culture (58.3%), top management support (52.8%) and the recruitment standards for SCM staffs (47.2%). In addition, the results showed that there are two of the CSFs were not existed in PSMC. These CSFs are the using of a moderate IT applications (42.6%) and the adequate logistic information system (40.7%).From this study, it is recommended to provide the medical city with a moderated logistical information system, provide the medical city with moderated logistics technologies and software, implementing formal training on SCM practices, ensuring the applying of the recruitment standards which includes specific certificates for all new staffs and finally, developing a collaborative environment and using the cross functional teams that backed by the top management support.

Keywords: Supply chain management (SCM), critical success factors (CSFs), effective SCM implementation, efficient SCM implementation, quality of health services.

INTRODUCTION

Supply Chain Management (SCM) involves the movement of goods, services, finance and information from the supplier to the end user. In hospitals, SCM includes a combination of organizational practices such as demand forecasting, purchasing, planning and scheduling, material management, stores, distribution and the delivery to the end customer in order to enhance clinical outcomes while controlling costs.

The importance of SCM in healthcare sector is from both the economic point and clinical aspects. From the economic point, according to Rachmania and Basri (2013) the hospital SCM consumed from 30 to 40 percent of the hospital budget, and it is the second largest cost behind labor. From the clinical aspects, SCM in health sector is important as well because any failure in the SCM practices could be resulted in life-threatening implications for patients. Therefore, hospitals and health care institutions are continuously seeking for new and innovative opportunities to potentially improve their SCM in an effort to control and manage costs effectively and improve patient safety (Cheng and Whittmore, 2008).

According to McKone-Sweet, Hamilton and Willis (2005), despite well-documented evidence of the advantages and cost reductions that can be achieved by adopting effective SCM practices in other industries, the health care industry has been slow to adopt such practices and there is a lack of success. The implementation of an effective SCM practices required the existence of a set of factors that help and facilitate the successful implementation processes. These factors are known as Critical Success Factors (CSFs). CSFs are those human, technological and indispensable business factors that help to achieve the desired goal of the organization (Turban *et al.,* 2000). The organization

should identify, analyzed and using its CSFs to ensure successful implementation of an effective SCM practices (Soin, 2004).

Ineffective SCM practices in hospitals poses negative influences such as the shortage of supplies, a high percentage of waste and excess amount of the unnecessary inventories. These negative influences may affect the quality of services that provided to patient and lead to financial loss at the same time. Prince Sultan Military Medical City (PSMC) in Riyadh is not excluded from dealing with such issues.

In PSMC, SCM activities are managed by the supply department wherein its role is to provide all departments with the medical and non-medical items that they need with respect to cost efficiency and high quality items.

The recent increase in the cost of materials and supplies in addition to the fact that SCM practices consume a high percentage of the typical hospital budget, add more pressure on the supply manager in PSMC and same managers in other hospitals in facing the challenging task of providing hospitals with items in a more cost-efficient manner without affecting the quality of services offered to patients. Therefore, in order to achieve the goal of cost-efficient SCM while providing high-quality services, an effective SCM practices should be implemented. The question that will rise is "what are the existed critical success factors for effective supply chain management practices implementation in PSMC". The research seeks to identify the critical success factors that facilitate the successful implementation of effective supply chain management practices. The identification of these factors and using them may lead to the improvement of the supply chain management practices which will result in cost reduction and quality improvement of the health services.

MATERIAL AND METHODS

The study used cross-sectional survey research and it involved a questionnaire to gather information and achieve the study objectives. The questionnaire consisted from three parts. The first part questionnaire included a covering letter to explain the purpose of the survey to the participant. The second part included participants' demographic information and the third part includes eight closed ended questions. Each question represents one of the CSFs for effective SCM practices implementation as identified in the literature review. The study population was including all supply department's staffs and supply representatives from other departments who are involved in the SCM practices in (PSMC) and any staffs who are not involved in SCM practices were excluded. The total number of the supply department staffs and the supply representatives from other medical city's departments is (200 employees). After the exclusion of the supply department staffs not involved in SCM practices (e.g., cleaners and porters), the total number of the target population was 189, and due to the small size of the target population, all target population was used in this study. Kirkwood and Stern (2003, p. 409) stated "Occasionally, a study includes the whole population of the confined area or institution". Therefore 189 questionnaires were distributed with the accepted response rate of 50 percent. The response rate was 57.2 percent (108 /189) which considered as a satisfied rate because this percentage is from the whole target population.

The collected data from the questionnaires that received from the respondents was checked and cleaned before the entry and analysis processes.

Data of the questionnaires was codified and analyzed using SPSS (Statistical Package for the Social Sciences) version 18.The five point likert scale was combined into three point scale (3(5,4)=agree; 2(3)=I can't decide; 1(1,2)=disagree).

Analysis for descriptive statistics (such as frequency) was calculated. Cross tabulations with chi-square test were used for the association analysis between dependent and independent variables and a P-value of <.05 was considered as a significant value.

RESULTS AND DISCUSSION

The collected data from the questionnaires that received from the respondents was analyzed and the results show the following:

Basic characteristics of participants

The response rate was 108 (57.2%) out of 189. All of the 108 responses were found to be usable. The majority of the respondents were from medical background that included pharmacists, nurses and other allied health personals. The respondents from the non medical background were come from different administrative and technical backgrounds. In addition, more than 80% of the participants in this survey were from male which can be attributed to the nature of the supply work. The majority of the respondents were Saudi. In this study, age groups were divided into three groups: less than 30 years, from 30 to 39 years and 40 and more. Highest number of the respondents was from the 30 to 39 years age group the fewest respondents fell in the less than 30 years group. According to their department, the highest percentage of the participants was from the supply department, followed by the participants from medical departments whereas the lowest percentage was the participants from non medical departments. Based on their role in the medical city SCM, the participants were divided into four categories: manager's category (which included for instance SC manager, material managers and stores managers).coordinator category, inventory controller category and "other" category (which included

participants who have other roles in the medical city SCM). The majority of the participants were from the "other" category whereas participants from the "manager" category were the least participatory of all. Participant's experience in the medical city SCM practices were divided into three categories: less than one year, from 1 to 5 years and more than 5 years. The highest percentages of the respondents were from the category "more than 5 years" experience in the medical city SCM. Whereas the lowest percentage was from respondents who had less than one year experience in the medical city.

Finally, educational levels of the participants were categorized into four groups: secondary, diploma, bachelor and other. The majority of the participants were from bachelor degree category while participants who had "other" educational level were the least participatory of all. The table 4.1 below shows the profile of the participants.

Table 4.1: Basic characteristics of the participants

Variable	Frequency	Percent
Background		
Pharmacist	43	39.8
Nurse	39	36.1
Allied Health Prof	17	15.7
Non-medical	9	8.3
Gender		
Male	90	83.3
Female	18	16.7
Nationality		
Saudi	89	82.4
Non-Saudi	19	17.6
Age		
Less than 30	26	24.1
30 to 39	44	40.7
40 and more	38	35.2
Department		
Supply	46	42.6
Medical department	41	38.0
Non medical department	21	19.4
Role in the medical city SCM		
Manager	15	13.9
Coordinator	24	22.2
Inventory controller	19	17.6
Other	50	46.3
Experience in the medical city SCM		
Less than one year	20	18.5
From 1 to 5 years	34	31.5
More than 5 years	54	50.0
Education Level		
Secondary	28	25.9
Diploma	34	31.5
Bachelor	36	33.3
Other	10	9.3

Critical Success Factors to Implementing SCM Practices:

Table 4.2 below shows the results of the questions that put forward to participants to determine their level of agreement regarding CSFs to effective SCM implementation in PSMC. Each question relates to specific topic considered in literature to be a CSF to effective SCM implementation.

1. Top management support (Q1):

Participants were asked to describe their level of agreement with the statement "Top management provides all resources required for effective SCM implementation". More than half of the participants (52.8%) agreed that the top management provides all resources required for effective SCM implementation.

2. Recruitment standards for SCM staffs (Q2):

The participants were questioned about the recruitment standards for SCM staffs: in PSMC. 47.2% of the participants agreed that the recruitment is based on certain scientific standards whereas (41.7%) disagreed.

3. Training and education on SCM activities (Q3):

Participants were asked to describe their level of agreement with the statement "Training & education in regards to SCM is sufficient". 62% agreed with this statement while 28.1% disagreed.

4. Logistic information system (Q4):

Participants were asked to put their level of agreement regarding the statement "The current electronic logistic information system is adequate for all supply management practices in my hospital ".only 40.7% agreed with this statement whereas 48.1% disagreed.

5. Modern logistic information technology applications usage (Q5):

When participants were asked if they use modern logistic IT applications in their inventory management, only 42.6% agreed whereas 47.2 %disagreed.

6. Level of information sharing (Q6):

Participants were asked about the level of information sharing between supply department and other medical city departments. The majority of the participants 63.9% agreed that there is a good level of information sharing between them.

7. Communication (Q7):

The participants were questioned about the the level of communication between SCM members. 62% of the participants agreed that the communication between SCM members is good.

8. Organizational culture (Q8):

When participants were asked if there is a cooperative organizational culture that supports SCM practices in PSMC, more than half of the participants (58.3%) agreed.

Table 4.2 below summarizes the findings regarding CSFs for implementing effective SCM practices in the PSMC.

Table 4.2: Summary of Findings Regarding CSFs for implementing effective SCM

QUESTION	Agree N (%)	Can't specify N (%)	Disagree N (%)
Q1. Top management provides all resources required for effective SCM implementation	57(52.8)	23(21.3)	28(25.9)
Q2. The recruitment of staff in the supply chain management are based on certain scientific standards and certificates	51(47.2)	12(11.1)	45(41.7)
Q3. Training & education in regards to SCM is sufficient	67(62.0)	11(10.2)	30(27.8)
Q4. The current electronic logistic information system is adequate for all supply management practices in my hospital	44(40.7)	12(11.1)	52(48.1)
Q5. We use modern applications of logistic information technology (i.e. computer software) in my department inventory management.	46(42.6)	11(10.2)	51(47.2)
Q6. Level of information sharing between supply department and other hospital departments is good.	69(63.9)	13(12.0)	26(24.1)
Q7. Level of communication between supply chain management members is good.	67(62.0)	18(16.7)	23(21.3)
Q8. We have cooperative organizational culture that supports supply chain management practices.	63(58.3)	15(13.9)	30(27.8)

Association of CSFs with basic characteristics of the participants:

CSFs were cross tabulated with the basic characteristics of the participants to test the inter-relations and found the significant differences. Results were as follow:

1-Association between basic characteristics of the participants and "top management support"

In Table 4.3 below, the participants were asked if the top management in PSMC provides all resources required for effective SCM implementation**.** More than half of the participants (52.8%) agreed. The chi-square test showed that there was a significant difference between male and female respondents (chi-square=9.713, p-value= 0.038). No significant difference occurred with any other variable.

Table 4.3: Cross tabulation of results for top management support for SCM practices with independent variables

Q1: Top management provides all resources required for effective SCM implementation.					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
Background					
Pharmacist	13(30.2)	9(20.9)	21(48.8)	3.809	.704
Nurse	9(23.1)	7(17.9)	23(59.0)		
Allied health personnel	3(17.6)	6(35.3)	8(47.1)		
Non-medical	3(33.3)	1(11.1)	5(55.6)		
Gender					
Male	22(24.4)	15(16.7)	53(58.9)	9.713	.038
Female	6 (33.3)	8(44.4)	4(22.2)		
Nationality					
Saudi	23(25.8)	17(19.1)	49(55.1)	1.644	.532
Non Saudi	5(26.3)	6(31.6)	8(42.1)		
Age in years					
Less than 30	6(23.1)	7(26.9)	13(50.0)	.767	.974
30 to 39	12(27.3)	8(18.2)	24(54.5)		
40 and more	10(26.3)	8(21.1)	20(52.6)		
Department					
Supply	13(28.3)	7(15.2)	26(56.5)	2.925	.731
Medical department	10(24.4)	9(22.0)	22(53.7)		
Non medical department	5(23.8)	7(33.3)	9(42.9)		
Role in the hospital SCM					
Manager	2(13.3)	0(0)	13(86.7)	9.842	.129
Coordinator	7(29.2)	6(25.0)	11(45.8)		
Inventory controller	6(31.6)	3(15.8)	10(52.6)		
Other	13(26.0)	14(28.0)	23(46.0)		

Q1: Top management provides all resources required for effective SCM implementation.					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
Experience in the hospital SCM					
Less than one year	5(25.0)	4(20.0)	11(55.0)	2.347	.448
From 1 to 5 years	6(17.6)	9(26.5)	19(55.9)		
More than 5 years	17(31.5)	10(18.5)	27(50.0)		
Educational level					
Secondary	7(25.0)	7(25.0)	14(50.0)	6.723	.256
Diploma	13(38.2)	7(20.6)	14(41.2)		
Bachelor	5(13.9)	8(22.2)	23(63.9)		
Other	3(30.0)	1(10.0)	6(60.0)		

2. Association between basic characteristics of the participants and "Recruitment standards for SCM staffs"

The cross tabulation in Table 4.4 was about the recruitment standards for SCM staffs. 47.2% of the participants agreed that the recruitment is based on certain scientific standards whereas (41.7%) disagreed The chi-square test showed that there was a significant difference between participants from different departments (chi-square=5.451, p-value=.048). No significant difference occurred with any other variable.

Table 4.4: Cross tabulation of results for recruitment standards for SCM staffs with independent variables

Q2: The recruitment of staff in the supply chain management are based on certain scientific standards and certificates					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
Background					
Pharmacist	16(37.2)	6(14.0)	21(48.8)	4.298	.413
Nurse	15(38.5)	4(10.3)	20(51.3)		
Allied health personnel	10(58.8)	2(11.8)	5(29.4)		
Non-medical	4(44.4)	0(0.0)	5(55.6)		
Gender					
Male	41(45.6)	10(11.1)	39(43.3)	3.689	.056
female	4(22.2)	2(11.1)	12(66.7)		
Nationality					
Saudi	37(41.6)	12(13.5)	40(44.9)	3.119	.603
Non Saudi	8(42.1)	0(0)	11(57.9)		
Age in years					
Less than 30	9(34.6)	2(7.7)	15(57.7)	4.332	.119
30 to 39	16(36.4)	7(15.9)	21(47.7)		
40 and more	20(52.6)	3(7.9)	15(39.5)		
Department					
Supply	14(30.4)	7(15.2)	25(54.3)	5.451	.048
medical department	19(46.3)	3(7.3)	19(46.3)		
non medical department	12(57.1)	2(9.5)	7(33.3)		
Role in the hospital SCM					
Manager	8(53.3)	2(13.3)	5(33.3)	4.092	.264
Coordinator	12(50.0)	1 (4.2)	11(45.8)		
Inventory controller	6(31.6)	2(10.5)	11(57.9)		
Other	19(38.0)	7(14.0)	24(48.0)		
Experience in the hospital SCM					
Less than one year	6(30.0)	2(10.0)	12(60.0)	3.641	.065
From 1 to 5 years	12(35.3)	4(11.8)	18(52.9)		
More than 5 years	27(50.0)	6(11.1)	21(38.9)		
Educational level					
Secondary	12(42.9)	6(21.4)	10(35.7)	6.948	.952
Diploma	13(38.2)	2(5.9)	19(55.9)		
Bachelor	14(38.9)	3 (8.3)	19(52.8)		
Other	6(60.0))	1(10.0)	3(30.0)		

3. Association between basic characteristics of the participants and "Training and education on SCM activities"

Participants were questioned in Table 4.5 if the training and education in the SCM practice is sufficient. 62% agreed while 28.1% disagreed. The chi-square test showed that there was no significant difference between all variables.

Table 4.5: Cross tabulation of results for training & education with independent variables

Q3:Training & education in regards to SCM is sufficient					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
Background					
Pharmacist	13(30.2)	6(14.0)	24(55.8)	2.776	.313
Nurse	11(28.2)	3(7.7)	25(64.1)		
Allied health personnel	4(23.5)	2(11.8)	11(64.7)		
Non-medical	2(22.2)	0(0)	7(77.8)		
Gender					
Male	26(28.9)	5(5.6)	59(65.6)	12.68	.529
Female	4(22.2)	6(33.3)	8(44.4)		
Nationality					
Saudi	26(29.2)	8(9.0)	55(61.8)	1.091	.671
Non Saudi	4(21.1)	3(15.8)	12(63.2)		
Age in years					
Less than 30	9(34.6)	5(19.2)	12(46.2)	4.775	.262
30 to 39	11(25.0)	3(6.8)	30(68.2)		
40 and more	10(26.3)	3(7.9)	25(65.8)		
Department					
Supply	11(23.9)	2(4.3)	33(71.7)	8.051	.726
Medical Department	15(36.6)	7(17.1)	19(46.3)		
Non medical department	4(19.0)	2(9.5)	15(71.4)		
Role in the hospital SCM					
Manager	5(33.3)	0(0)	10(66.7)	14.44	.301
Coordinator	4(16.7)	0(0)	20(83.3)		
Inventory controller	8(42.1)	1(5.3)	10(52.6)		
Other	13(26.0)	10(20.0)	27(54.0)		
Experience in the hospital SCM					
Less than one year	5(25.0)	5(25.0)	10(50.0)	9.326	.143
From 1 to 5 years	13(38.2)	3(8.8)	18(52.9)		
More than 5 years	12(22.2)	3(5.6)	39(72.2)		
Educational level					
Secondary	6(21.4)	2(7.1)	20(71.4)	3.854	.855
Diploma	13(38.2)	4(11.8)	17(50.0)		
Bachelor	8(22.2)	4(11.1)	24(66.7)		
Other	3(30.0)	1(10.0)	6(60.0)		

4. Association between basic characteristics of the participants and "logistic information system"

The cross tabulation in Table 4.6 was about the current logistic information system in PSMC if it is enough for all supply management practices. Only 40.7% agreed with this statement whereas 48.1% disagreed.

The chi-square test showed that there was a significant difference between participants from different age groups (chi-square=6.245, p-value=.043).In addition, the chi-square test showed that there was a significant difference between participants from different experience years in the medical city (chi-square=8.746, p-value=.004). No significant difference occurred with any other variable.

Table 4.6: Cross tabulation of results for logistic information system with independent variables

Q4:The current electronic logistic information system is adequate for all supply management practices in my hospital					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
Background					
Pharmacist	20(46.5)	5(11.6)	18(41.9)	4.172	.949
Nurse	20(51.3)	2(5.1)	17(43.6)		
Allied health personnel	9(52.9)	3(17.6)	5(29.4)		
Non-medical	3(33.3)	2(22.2)	4(44.4)		
Gender					
Male	43(47.8)	9(10.0)	38(42.2)	0.906	.649
Female	9(50.0)	3(16.7)	6(33.3)		
Nationality					
Saudi	42(47.2)	9(10.1)	38(42.7)	1.025	.488
Non Saudi	10(52.6)	3(15.8)	6(31.6)		
Age in years					
Less than 30	7(26.9)	4(15.4)	15(57.7)	6.245	.043
30 to 39	24(54.5)	4(9.1)	16(36.4)		
40 and more	21(55.3)	4(10.5)	13(34.2)		
Department					
Supply	20(43.5)	3(6.5)	23(50.0)	4.378	.182
Medical Department	21(51.2)	5(12.2)	15(36.6)		
Non Medical Department	11(52.4)	4(19.0)	6(28.6)		
Role in the hospital SCM					
Manager	8(53.3)	1(6.7)	6(40.0)	8.482	.763
Coordinator	11(45.8)	1(4.2)	12(50.0)		
Inventory controller	10(52.6)	0(0.0)	9(47.4)		
Other	23(46.0)	10(20.0)	17(34.0)		
Experience in the hospital SCM					
Less than one year	6(30.0)	2(10.0)	12(60.0)	8.746	.004
From 1 to 5 years	13(38.2)	4(11.8)	17(50.0)		
More than 5 years	33(61.1)	6(11.1)	15(27.8)		
Educational level					
Secondary	14(50.0)	5(17.9)	9(32.1)	3.763	.836
Diploma	14(41.2)	3(8.8)	17(50.0)		
Bachelor	18(50.0)	3(8.3)	15(41.7)		
Other	6(60.0)	1(10.0)	3(30.0)		

5. Association between basic characteristics of the participants and "modern logistic information technology applications usage"

In Table 4.7 below, the participants were asked if they use the modern logistic information technology applications in their inventory management. Only 42.6% agreed whereas 47.2 %disagreed. The chi-square test showed that there was no significant difference between all variables.

Table 4.7: Cross tabulation of results for use of modern logistic information technology with independent variables

Q5: We use modern applications of logistic information technology (i.e. computer software) in my department inventory management.					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
Background					
Pharmacist	13(30.2)	5(11.6)	25(28.1)	14.49	.061
Nurse	25(64.1)	2(5.1)	12(30.8)		
Allied health personnel	8(47.1)	4(23.5)	5(29.4)		
Non-medical	5(55.6)	0(0)	4(44.4)		
Gender					
Male	40(44.4)	10(11.1)	40(44.4)	1.772	.258
Female	11(61.1)	1(5.6)	6(33.3)		
Nationality					
Saudi	39(43.8)	10(11.2)	40(44.9)	2.446	.174
Non Saudi	12(63.2)	1(5.3)	6(31.6)		
Age in years					
Less than 30	10(38.5)	2(7.7)	14(53.8)	2.598	.128
30 to 39	20(45.5)	5(11.4)	19(43.2)		

Q5: We use modern applications of logistic information technology (i.e. computer software) in my department inventory management.					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
40 and more	21(55.3)	4(10.5)	13(34.2)		
Department					
Supply	20(43.5)	5(10.9)	21(45.7)	3.591	.488
Medical department	21(51.2)	2(4.9)	18(43.9)		
Non medical department	10(47.6)	4(19.0)	7(33.3)		
Role in the hospital SCM					
Manager	6(40.0)	2(13.3)	7(46.7)	5.958	.404
Coordinator	10(41.7)	1(4.2)	13(54.2)		
Inventory controller	10(52.6)	4(21.1)	5(26.3)		
Other	25(50.0)	4(8.0))	21(42.0)		
Experience in the hospital SCM					
Less than one year	10(50.0)	4(20.0)	6(30.0)	5.152	.940
From 1 to 5 years	13(38.2)	4(11.8)	17(50.0)		
More than 5 years	28(51.9)	3(5.6)	23(42.6)		
Educational level					
Secondary	12(42.9)	3(10.7)	13(46.4)	7.566	.474
Diploma	16(47.1)	4(11.8)	14(41.2)		
Bachelor	18(50.0)	1(2.8)	17(47.2)		
Other	5(50.0)	3(30.0)	2(20.0)		

6. Association between basic characteristics of the participants and "level of information sharing"

The cross tabulation in Table 4.8 was about the level of information sharing between supply department and other medical city departments. 63.9% of the participants agreed that there is a good level of information sharing between them whereas 24.1% disagreed.

The chi-square test showed that there was a significant difference between participants from different roles in the medical city SCM (chi-square=19.69, p-value=.007). No significant difference occurred with any other variable.

Table 4.8: Cross tabulation of results for level of information sharing with independent variables

Q6: Level of information sharing between supply department and other hospital departments is good					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
Background					
Pharmacist	12(27.9)	6(14.0)	25(58.1)	1.693	.270
Nurse	9(23.1)	4(10.3)	26(66.7)		
Allied health personnel	4(23.5)	2(11.8)	11(64.7)		
Non-medical	1(11.1)	1(11.1)	7(77.8)		
Gender					
Male	22(24.4)	8(8.9)	60(66.7)	5.129	.512
Female	4(22.2)	5(27.8)	9(50.0)		
Nationality					
Saudi	22(24.7)	10(11.2)	57(64.0)	0359	.897
Non Saudi	4(21.1)	3(15.8)	12(63.2)		
Age in years					
Less than 30	6(23.1)	2(7.7)	5(19.2)	1.742	.742
30 to 39	11(25.0)	4(9.1)	29(65.9)		
40 and more	9(23.7)	4(10.5)	25(65.8)		
Department					
Supply	12(26.1)	2(4.3)	32(69.6)	1.108	.886
Medical department	10(24.4)	9(22.0)	22(53.7)		
Non medical department	4(19.0)	2(9.5)	15(71.4)		
Role in the hospital SCM					
Manager	1(6.7)	0(0.0)	14(93.3)	19.69	.007
Coordinator	2(8.3)	3(12.5)	19(79.2)		
Inventory controller	10(52.6)	1(5.3)	8(42.1)		
Other	12(26.0)	9(18.0)	28(56.0)		
Experience in the hospital SCM					
Less than one year	6(30.0)	5(25.0)	9(45.0)		

Q6: Level of information sharing between supply department and other hospital departments is good					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
From 1 to 5 years	7(20.6)	5(14.7)	22(64.7)	6.817	.212
More than 5 years	13(24.1)	3(5.6)	38(70.4)		
Educational level					
Secondary	8(28.6)	3(10.7)	17(60.7)	2.405	.646
Diploma	9(26.5)	3(8.8)	22(64.7)		
Bachelor	6(16.7)	6(16.7)	24(66.7)		
Other	3(30.0)	1(10.0)	6(60.0)		

7. Association between basic characteristics of the participants and "communication"

Regarding the question about the level of the communication between SCM members in Table 4.9**.** 62% of the participants agreed that the communication between SCM members is good whereas 21.3% disagreed.

The chi-square test showed that there was a significant difference between participants from different experience years in the medical city (chi-square=11.58, p-value=.009). No significant difference occurred with any other variable.

Table 4.9: Cross tabulation of results for level of communication with independent variables

Q7: Level of communication between SCM members is good.					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
Background					
Pharmacist	11(25.6)	7(16.3)	25(58.1)	1.087	.512
Nurse	7(17.9)	7(17.9)	25(64.1)		
Allied health personnel	3(17.6)	3(17.6)	11(64.7)		
Non-medical	2(22.2)	1(11.1)	6(66.7)		
Gender					
Male	19(21.1)	12(13.3)	59(65.6)	4.686	.294
Female	4(22.2)	6(33.3)	8(44.4)		
Nationality					
Saudi	19(21.3)	15(16.9)	55(61.8)	016	.936
Non Saudi	4(21.1)	3(15.8)	12(63.2)		
Age in years					
Less than 30	5(19.2)	8(30.8)	13(50.0)	5.17	.745
30 to 39	9(20.5)	5(11.4)	30(68.2)		
40 and more	9(23.7)	5(13.2)	24(63.2)		
Department					
Supply	7(15.2)	6(13.0)	33(71.7)	5.124	.365
Medical Department	12(29.3)	9(22.0)	20(48.8)		
Non Medical Department	4(19.0)	3(14.3)	14(66.7)		
Role in the hospital SCM					
Manager	1(6.7)	0(0.0)	14(93.3)	7.766	.067
Coordinator	5(20.0)	5(20.0)	14(58.3)		
Inventory controller	5(26.3)	3(15.8)	11(57.9)		
Other	12(24.0)	10(20.0)	28(56.0)		
Experience in the hospital SCM					
Less than one year	7(35.0)	5(25.0)	8(40.0)	11.58	.009
From 1 to 5 years	7(20.6)	9(26.5)	18(52.9)		
More than 5 years	9(16.7)	4(7.4)	41(75.9)		
Educational level					
Secondary	6(21.4)	4(14.3)	18(64.3)	2.281	.673
Diploma	6(17.6)	8(23.5)	20(58.8)		
Bachelor	8(22.2)	4(11.1)	24(66.7)		
Other	3(30.0)	2(20.0)	5(50.0)		

8. Association between basic characteristics of the participants and "organizational culture"

In Table 4.10, the participants were asked if the organizational culture in PSMC is a cooperative culture. 58.3% of the participants agreed whereas 27.8% disagreed.

The chi-square test showed that there was no significant difference between all variables.

Table 4.10: Cross tabulation of results for organizational culture with independent variables

Q8: We have cooperative organizational culture that supports supply chain management practices.					
Variables	**Disagree N. (%)**	**Can't specify N. (%)**	**Agree N. (%)**	**Chi-sq**	**P value**
Background					
Pharmacist	12(27.9)	8(18.6)	23(53.5)	5.081	.856
Nurse	8(20.5)	5(12.8)	26(66.7)		
Allied health personnel	7(41.2)	2(11.8)	8(47.1)		
Non-medical	3(33.3)	0(0.0)	6(66.7)		
Gender					
Male	24(26.7)	10(11.1)	56(62.2)	4.640	.187
Female	6(33.3)	5(27.8)	7(38.9)		
Nationality					
Saudi	26(29.2)	10(11.2)	53(59.6)	3.067	.955
Non Saudi	4(21.1)	5(26.3)	10(52.6)		
Age in years					
Less than 30	8(30.8)	4(15.4)	14(53.8)	1.580	.293
30 to 39	14(31.8)	6(13.6)	24(54.5)		
40 and more	8(21.1)	5(13.2)	25(65.8)		
Department					
Supply	13(28.3)	7(15.2)	26(56.5)	.850	.958
Medical Department	10(24.4)	6(14.6)	25(61.0)		
Non Medical Department	7(33.3)	2(9.5)	12(57.1)		
Role in the hospital SCM					
Manager	2(13.3)	2(13.3)	11(73.3)	10.46	.290
Coordinator	7(29.2)	1(4.2)	16(66.7)		
Inventory controller	9(47.4)	1(5.3)	9(47.4)		
Other	12(24.0)	11(22.0)	27(54.0)		
Experience in the hospital SCM					
Less than one year	3(15.0)	3(15.0)	14(70.0)	9.171	.709
From 1 to 5 years	15(44.1)	6(17.6)	13(38.2)		
More than 5 years	12(22.2)	6(11.1)	36(66.7)		
Educational level					
Secondary	9(32.1)	4(14.3)	15(53.6)	2.128	.868
Diploma	8(23.5)	6(17.6)	20(58.8)		
Bachelor	9(25.0)	4(11.1)	23(63.9)		
Other	4(40.0)	1(10.0)	5(50.0)		

DISCUSSION

The ultimate goal for this study was to identify the critical success factor for the implementation of effective SCM Practices in PSMC so that the administration can use these factors for successful implementation and to improve the SCM in the medical city. The results of the study revealed the existence of most of the CSFs that identified in the existing literature .but it also revealed that there is a lack of some factors. Therefore the administration should deals with these factors which were not existed. In addition, the other objective of this study was to determine the relationship between the existence of these CSFs and the basic characteristics of the participants

The results of the survey showed that the employees who are involved in the SCM practices in the medical city were come from both medical and non medical backgrounds 91.7% and 8.3% respectively .in addition they come from different educational levels. This finding suggests the lack of professional's employees in SCM in PSMC.Therefore; this result suggests the needed to do efforts to train employees on SCM. As reviewed in the literature, employees training represent one of the important requirements for successful implementation for SCM practices (Gowen & Tallon, 2002), and provides many savings in hospitals expenditures due to SCM. This finding is consistent with the results of Burns (2002) who found that lack of employees training in SCM practices is one of the obstacles to effective SCM in hospitals.

Additionally, this finding suggests the need for proper hiring practices for the employees who are working in SCM. Hiring practices should be based upon specific qualification standards which may include professional certifications and experience.

The findings of the study on each of the CSFs are discussed below and they arranged from the highest to the lowest proportion according to the level of participants agreement:

Information sharing (63.9%):

Level of information sharing between supply department and other medical city departments was found to be a major CSF in this study. A majority (63.9 % of the participants) agreed that the level of information sharing between supply department and other medical city departments is good. This finding is consisted with the result of Callender and Grasman (2010) who found that information sharing between SCM members is a CSF for effective SCM implementation. Cross-tabulation of level of information sharing between supply department and other medical city departments with independent variables showed that there was a significant differences between participants from different roles in the medical city SCM (chi-square=19.69, p-value=..007).The results showed that managers agreed more than others. This finding might be because there is a regular weekly meeting between directors of departments that are involved in SCM activities in PSMC such as supply, purchasing and finance departments. Therefore they feel that there is a good level of information sharing between members.

Information sharing between members improves the visibility of the inventory throughout the SCM. It creates a good climate for collaboration (Bagchi & Skjoett-Larsen, 2002). In addition; developments in the area of information sharing have many benefits and improvements for SC (Bohme, 2009). According to Fawcett, Magnan, and McCarter (2008). Unwilling to share information can be attributed to the fact that some employees view information as a power especially when trust between partners does not exist.

On contrary, lack or limited information sharing lead to inefficiency of the SC and it has been identified in the literature as a barrier for the implementation of SCM practices.

Training & education in SCM activities (62%):

Training and education was found to be a major CSF in this survey. 62% of the participants agreed that there is a sufficient training & education for SCM staff in PSMC. This finding is consistent with result of McKone-Sweet *et al*., (2005), Callender and Grasman (2010) and Tummala *et al*., (2006) who indicated that one of the major CSFs for effective SCM implementation is the existence of a sufficient training for the staffs of SCM. Unlike other industries, in healthcare industry many of employees who are working in the area of SCM are from medical staff (such as pharmacists, physicians and nurses) and they do not have a proper training or education on SCM (Woosley, 2009). In most hospitals clinicians are receiving education whereas materials managers do not receive any formal training (McKone-Sweet *et al*., 2005). According to Burns (2002), one of the obstacles to effective SCM in hospitals is the inadequate education on SCM.

Cross-tabulation of training and education in SCM with independent variables showed that there was no significant difference between all variables. This finding suggested that there is an efforts being made in PSMC to improve skills and knowledge of the SCM staff by providing training and education in SCM practices.

Communication *(62%):*

The results of the survey showed that 62% of the participants agreed that the communication between SCM members is good. Whereas only 21.3 % disagreed. This finding is consisted with the result of McKone-Sweet *et al*., (2005) who found that communication between SCM members is one of the CSFs for effective SCM practices implementation.

Cross-tabulation of results for communication between SCM members with independent variables showed that that there was a significant difference between participants from different experience years in the medical city (chi-square=11.58, p-value=..009). participants with experience more than 5 years in PSMC SCM agreed more than others. This might be due the long period that they spend in SCM practices in PSMC so that they built channels of communication with other staffs from other departments therefore they were more likely feeling that the level of communication is good.

Organizational Culture (58.3%):

A cooperative organizational culture that supports SCM practices was found be a CSF in this study. 58.3 % of the participants agreed that there is a cooperative organizational culture that supports SCM in PSMC. While only 27.8% of the participants disagreed. This finding is consisted with the result of Syazwan and Abu Bakar (2014) and Tummala *et al*., (2006) who found that corporate culture that supports SCM practices is a CSF for effective SCM implementation. The culture of the organization is an important ingredient for adoption and implementation of SCM. The organizational cultures have the potential to both facilitate and impede implementation of SCM.

Furthermore, cultures that focusing on employees blaming rather than solutions are definitely detrimental for SCM integration. This because this type of culture is unlikely to encourage open communication and even if it does it will result in many angry meetings. Nelson *et al*., (2001) (as cited by McKone-Sweet *et al*., 2005) point out that for successful SC in healthcare sector there is a need for the organizational

culture that allows for information sharing between members. In addition, the hospital is divided into several department and they do not work together effectively which increase the cost of SCM practices and this can be solved through a holistic collaboration of material management, pharmacy, physicians and other support services. The cooperative culture will facilitate the information sharing, communication and coordination between SCM members.

The results of the cross-tabulation for open and honest organizational culture that supports SCM practices with independent variables showed that there was no significant difference between all variables.

Top management support (52.8%):

The support from the top management in PSMC found in this study to be a CSF for effective SCM practices. More than half of the participants (52.8 %) agreed that there is a support from the top management by providing all resources required for effective SCM practices implementation. This finding is consistent with the results of Syazwan and Abu Bakar (2014) who found that top management support as a CSF for effective SCM practices. This result suggested that the top management in PSMC is aware of the importance of SCM and its significant role in the medical city.

Cross-tabulation of top management support in medical city with independent variables suggested that the male participants agreed more than female participants which was a significant difference (p-value=0.038). Such result might be attributed to the cultural factors that may limit the level of communication between females and male directors therefore it become difficult for females to evaluate the level of supporting from the top management for the SCM practices.

Recruitment standards (47.2%)

The survey results showed that the recruitment standards of staff in PSMC SCM were a CSF for effective SCM implementation. Based on certain scientific standards and certificates was found to be a CSFs for effective SCM practices. 47.2% of the participants agreed that the recruitment is based on certain scientific standards. This finding is consistent with result of Syazwan and Abu Bakar (2014) and McKone-Sweet et al. (2005) who found the existence of specific recruitment standards for SCM staffs as a major CSF for effective SCM implementation.

Cross-tabulation of recruitment standards in PSMC with independent variables showed that the participants from supply department agreed more than participants from both medical and non-medical departments which was a significant difference (chi-square=5.451, p-value=..048).This can be attributed to that the supply department in PSMC renewed the job descriptions for all jobs in the last two years and it was included the updating of the required educational level and certificate for each job. In addition, all other departments (medical & non-medical) do not have specific job for supply representative but they assign one employee for this job from their employees for example nurse or technician. Furthermore, this finding call for more administration attention in regards to recruitment criteria required for recruiting of staffs in SCM in PSMC.

Modern logistic information technology application usage (42.6%):

The results of the survey showed that there is a lack of the using of modern logistic IT applications in inventory management in PSMC departments. Only 42.6% agreed that they use modern logistic IT applications in their inventory management whereas 47.2 %disagreed. According to Syazwan and Abu Bakar (2014), when the CSFs are not existed they can be in somewhat become an obstacles for SCM implementation. This finding is consistent with the results of McKone-Sweet et al. (2005) who found that lack of the using of a modern IT in SCM practices is a major barrier for the implementation.

Cross-tabulation of results for modern logistic information technology application usage with independent variables showed that that there was no significant difference between all variables. Furthermore, the results of the cross-tabulation showed that inventory controller disagreed more than others. This might be because they faced a lot of problems in the calculations of inventories levels and demand forecasting in their daily work than others. Therefore they feel that they need to use a modern IT applications and new computer software which facilitate their work and improve the accuracy of the calculations of their inventory levels.

Limited use of logistic information technology in SCM practice in the hospital lead to the inefficiency of the SC. for instance using of manual processes to determine products reorder which lead to frequent stock-outs or excess inventory levels. While the use of computer software to calculate the inventory quantities will provide more accuracy and decrease both the user intervention and time to process orders (Kim, 2005).

Findings of this study indicate the need for more attention from the hospital administration in logistic information technology issues.

Logistic information system (40.7%)

The results of the survey showed that 48.1 % of the participants disagreed that the current logistic information system is adequate for all SCM practices whereas only 40.7 % agreed. This result might be due to the fact that the current logistical information system is part of the hospital information system; therefore, it

includes only the basic proprieties, which is not enough for all logistical operations. This finding is consistent with the results of Bohme (2009) and Fawcett, Magnan and McCarter (2008), who found that that inadequate information system is a major barrier for effective SCM implementation.

Cross-tabulation of results for logistic information system with independent variables showed that a significant difference between participants from different age groups (chi-square=6.245, p-value=.043).In addition, the chi-square test showed that there was a significant difference between participants from different experience years in the medical city (chi-square=8.746, p-value=.004) participants who have more than 5 years experience in PSMC SCM practices disagreed more than others which can be attributed to that they faced more problems with current logistic information system during their daily work. Lack of appropriate logistic information system resulted in the lack of the visibility of the SC which may have several implications such as inventory increases or shortages of some items which may become life threatening in some cases. Furthermore, According to Mckone-Sweet et al. (2005), many of the available information systems in hospitals are not sophisticated enough to assist with SCM practice such as inventory management, communicating with partners, monitoring costs and. standard codes.

CONCLUSION AND RECOMMENDATION

CONCLUSIONS

The main purpose for this study was to identify CSFs for effective SCM practices implementation in PSMC. The study has achieved this purpose. From the results of this study we can concluded the following:

1) Most of the CSFs for effective SCM practices implementation which identified by literature are existed in PSMC.
2) There are two of the CSFs that identified by literature were not existed in PSMC.
3) The existed CSFs included: information sharing, training and education on SCM activities, communication, organizational culture that supports the SCM practices in PSMC, top management support and the recruitment standards for SCM staffs.
4) The two CSFs that were not existed in PSMC were the using of modern logistic IT applications for inventory management and the adequate logistic information system.

RECOMMENDATIONS

Based on the literature review and the results of the study, immediate actions are recommended in many areas for successful implementation of effective SCM practices in PSMC as following:

1) Providing the medical city with a moderated logistical information system that is adequate for all supply processes.
2) Providing the medical city with moderated logistics technologies and software that facilitate the work in inventory management activities with providing employees with proper training to use these technologies.
3) Implementing formal training on SCM practices to improve the skills and knowledge of employees involved in the practices including new staffs and supply representatives from other departments.
4) Ensuring the applying of the recruitment standards which includes specific certificates for all new staffs.
5) Facilitating the collaborative environment and using the cross functional teams that backed by the top management support.

REFERENCES

- Rachmania, I. N., & Basri, M. H. (2013). Pharmaceutical Inventory Management Issues in Hospital Supply Chains, Management, 3(1), 1-5.
- Cheng, S., & Whittemore, G. (2008). An Engineering Approach to Improving Hospital Supply Chains. MS. Taiwan. Massachusetts Institute of Technology.
- McKone-Sweet, K. E., Hamilton, P., & Willis, S. B. (2005). The ailing healthcare supply chain: A prescription for change. *Journal of Supply Chain Management*, 41(1), 4-14.
- Turban, E., Lee, J., King, D., & Chung, H. M. (2000), Electronic Commerce A Managerial Perspective, Prentice-Hall International, London.
- Soin, S. S. (2004). "Critical Success Factors in Supply Chain Management at High Technology Companies" DBA thesis, University of Southern Queensland.
- Kirkwood, B. R., & Stern, J. A. C. (2003). Essential Medical Statistics, 2nd ed., Oxford: Blackwell Science Ltd.
- Gowen III, C., & Tallon, W. (2002) Enhancing supply chain practices through human resource management. *Journal of Management Development*, 22(1), 32-44.
- Burns, L. R. (2002). The health care value chain. San Francisco: Jossey-Bass.
- Callender, C., & Grasman, S. E. (2010). Barriers and Best Practices for Material Management in the Healthcare Sector. *Engineering Management Journal*, 22(4), 11-19.
- Bagchi, P. K., & Skjott-Larsen, T. (2002). Integration of information technology and organizations in a supply chain. *The International Journal of Logistics Management*, 14(1), 89-108.
- Bohme, T. (2009). Supply Chain Integration: A Case-based Investigation of Status, Barriers, and

Paths to Enhancement. PhD Thesis. The University of Waikato.

- Fawcett, S., Ogden, J., Magnan, G., & Cooper, M. (2006). Organizational commitment and governance for supply chain success. *International Journal of Physical Distribution and Logistics Management*, 36(1), 22.
- Tummala, V. M., Rao, C., Phillips, M., & Johnson, M. (2006). Assessing Supply Chain Management Success Factors: A Case Study. *Supply Chain Management: An International Journal*, 11(2), 179-192.
- Woosley, J. (2009). Improving Healthcare Supply Chains and Decision Making In the Management of Pharmaceuticals. PhD Thesis. Louisiana State University.
- Syazwan, A. T., & Abu Bakar, A. H. (2014). Application of Critical Success Factors in Supply Chain Management, *International Journal of Supply Chain Management*, 3(1).
- Kim, D. (2005). An Integrated Supply Chain Management System: a Case Study in Healthcare Sector. *Lecture Notes in Computer Science*, 3590, 218-227.