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**Just in Time Supply Chain Practices in Developing Countries: A case of the Public  
Healthcare Sector in Botswana**

**Kabossa A.B. Msimangira  
School of Business  
Open Polytechnic of New Zealand  
Auckland Learning Centre  
Box 6558, Wellesley Street  
Auckland 1141  
New Zealand**

**Phone: + 64 9 918 4655**

**E-mail: [kabossa.msimangira@openpolytechnic.ac.nz](mailto:kabossa.msimangira@openpolytechnic.ac.nz)**

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## **Abstract**

The Just in Time (JIT) philosophy and supply chain management (SCM) have been widely practiced in developed countries than in the developing countries. Little is known regarding the JIT practices in public healthcare sector in developing countries, especially in Africa. This paper reports the problems associated with using JIT supply chain technique and highlights JIT supply chain practices in public healthcare sector in Botswana. Data were collected using a triangulation of methods: interviews, a survey, and personal observation. The findings and recommendations to solve some of the key problems are presented.

**Keywords:** Just in time, supply chain, Healthcare, Developing countries, Botswana.

### **1.0 Introduction**

The operations of healthcare in the 21<sup>st</sup> century will continue to improve using modern techniques, such as Just in Time supply chain management. The JIT philosophy and its benefits, and supply chain management have been widely covered in the literature. The author defines the JIT supply chain in healthcare as effective and efficient management, planning, control, and co-ordination of all activities in the supply chain to move sufficient medical supplies from the source (e.g., overseas or local central medical store) to the final consumer (e.g., hospital, clinic or a patient). The activities must be performed when needed at the right time, not earlier or later in the supply chain. In short, we define JIT supply chain in healthcare as value added in performing activities of moving medical supplies from the right source to the point of consumption or use, at the right time, and at reduced cost in order to enhance the quality of the service in the hospitals and clinics.

This paper examines the critical issues facing supply chain management in the healthcare sector, especially in developing countries like Botswana. The problems regarding the supply of medical drugs to the hospitals and clinics were reported by Jwaneng Town Council (JTC) to source drugs from private companies instead of the central medical stores (CMS), which proved unreliable in providing the JTC with required drugs (Daily News, 2005). The JTC revealed that the move was proving successful and “the drugs situation in clinics has now stabilised. The move is coming at a cost to the council as they were now spending more than they did when supplied by the Central Medical Stores.” (Daily News Online, 2005).

Botswana hospitals and clinics, like those in developed countries, can start using JIT supply chain in healthcare sector in order to reduce operational costs and improve quality of services to patients. That is, drugs and other medical services should be provided to the patients when they are needed. In this case Botswana is required to have an efficient supply chain to achieve strategic supply chain benefits. Although just-in-time supply chain can improve healthcare services in Botswana, there is no evidence to show that public hospitals and clinics have adopted the practice or philosophy, like those in developed countries. In addition, the impact of the purchasing and supply problems on meeting purchasing objectives; and the impact of the problems of using JIT in the healthcare organisations in Botswana are not known. This research aimed to fill this gap.

Furthermore, this study examines supply chain personnel performance in supplying requirements to hospitals and clinics, and provides recommendations to alleviate some of the problems.

## **2.0 Background information**

Botswana is one of the African developing countries, which have enjoyed democratic political and economic system since independence in 1966. It is a country with an impressive economic growth rate, which depends mainly on diamond mining.

“Botswana has maintained one of the world’s highest growth rates since independence in 1966. Through fiscal discipline and sound management, Botswana has transformed itself from one of the poorest countries in the world to a middle-income country with a per capita GDP of \$ 9,500 in 2002” (NationMaster, 2004). The economy has maintained an average real annual growth rate of 6 percent and per capita income has increased over Botswana Pula 40,000 (approximately US\$ 6,232) (Budget speech, 2008).

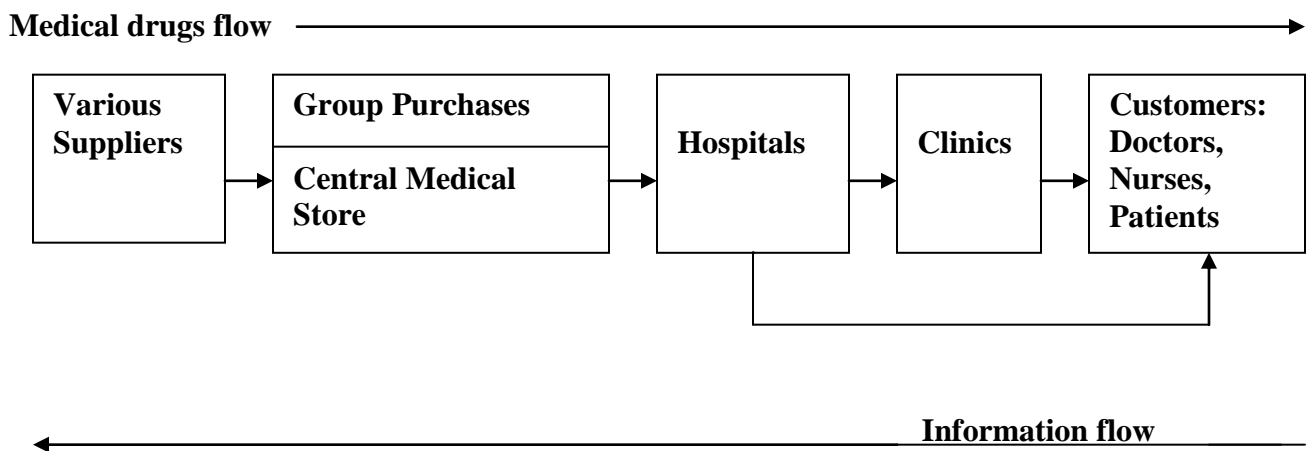
The Republic of Botswana is situated in Southern Africa, nestled between South Africa, Namibia, Zimbabwe, and Zambia. The country is democratically ruled, boasts a growing economy and a stable political environment. Botswana has some of Africa's last great wildernesses including the famous Okavango Swamps and the Kalahari desert. Botswana is the largest exporter of gemstone diamonds in the world as well as a large beef exporter to the European Economic Community (Republic of Botswana, 2007).

The healthcare infrastructure system is one of the best in Africa and the government is committed to continue improving the services of clinics and hospitals so that they can

provide high quality services to patients in towns and rural areas. Most countries in developing countries like Botswana do not produce their own medical drugs and supplies. Botswana imports drugs and other medical supplies through the government owned central medical store. Then hospitals and clinics order their requirements from the central medical store, which is located in the capital city Gaborone with no branches in other towns (see Figure I).

**Figure 1: Medical drugs supply chain network in public healthcare sector in**

**Botswana**



**2.1 Just in time supply chain experiences in public healthcare in Botswana**

This paper establishes whether just in time supply chain management can be implemented and identifies current practices and problems facing the public healthcare sector in Botswana. The objective of the study was to identify problems associated with using the just-in-time supply chain technique in Botswana. Problems and practices in supply chain in the clinics and hospitals were revealed. The following sections of the article examine data relating to the rating of purchasing and supplies problems, rating of

problems of using just-in-time in healthcare organisations, rating of purchasing objectives, and rating of purchasing and stores personnel performance. Thus, the results lead to a clear understanding of problems and practices in using just-in-time supply chain in healthcare in developing countries, with particular reference to the hospitals and clinics in Botswana.

The current supply chain of medical drugs in public healthcare sector in Botswana is depicted in Figure 1. Medical drugs move from various suppliers to the Botswana central medical stores, hospitals, clinics, and the final customers: doctors, nurses and patients. There is physical movement of goods and services from the suppliers to the final consumers, and the flow of information from the final customers to the suppliers. In order for the supply chain to work effectively and efficiently, and adding value, there is a need for management to alleviate the purchasing and supply chain problems identified by the respondents. Proactive and vision managers who can build supply chain relationships are needed to make JIT supply chain work.

This paper highlights the responses from sixty nurses who work in the public hospitals and clinics, and the central medical stores I visited or consulted in Botswana. In addition, other views were expressed by my students - nurses from the hospitals and clinics who were pursuing a Diploma in Nursing Administration at the Institute of Development Management (IDM) in Botswana. The nurses studied just-in-time philosophy in the module on “managing medical supplies” in healthcare sector and were asked whether it is possible to implement the JIT philosophy in their clinics and hospitals after graduation,

and whether the JIT supply chain can be used in Botswana to reduce operational costs and improve productivity, quality of healthcare services, and customer focus.

### **3.0 Literature review**

#### **3.1 Just in time**

The just-in-time (JIT) concept is widely covered in the literature. There are many variations concerning the meaning of JIT, depending on the application of the concept. JIT implies a continuous search for waste reduction and to make only what is needed “just in time” (Toyoda, 1987). Most of the papers published about JIT focus on the application of the concept in the manufacturing environment (John & Heriot, 1993).

Hall (1983) defines JIT as a philosophy where all goods are to arrive exactly when they are needed, that is, neither too soon nor too late. The objectives of JIT are stockless production and elimination of waste (Hall, 1983). Schonberger (1982, p. 17) defines the JIT concept as “produce and deliver finished goods just in time to be sold, subassemblies just in time to be assembled into finished goods, fabricated and / or produced parts just in time to go into subassemblies, and purchased materials just in time to be transformed into fabricated parts.” The principle is that no products should be manufactured or shipped until there is a demand for them (Christopher, 1998).

Although JIT has been implemented successfully in most companies in developed countries, developing countries like Botswana lag behind that of developed countries in implementing the JIT concept. Developing countries still face many problems to adopt

JIT. For example, Msimangira (1993) points out the following problems facing Tanzania (the developing country) in using JIT: (1) financial constraints; (2) inadequate supply of inputs required for the company to operate near capacity; (3) international delivery delays; (4) an inadequate transportation infrastructure, and (5) unreliable product demand forecasts.

### **3.2 Supply Chain**

Supply chain (SC) is a complex network of organisations covering both on the upstream side including tiers of suppliers and on the downstream side including a network of customer companies, retailers and financial consumers (Desouza, Chattaraj, & Kraft, 2003). Christopher (1992, p. 12) defines supply chain as “the network of organisations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer.” Dershin (2000) claims that the supply chain is the “mother of all processes” because of the nature of its size, scope, and complexity, nearly all the processes in the supply chain are not under control.

Msimangira (2003) emphasise that the purchasing and supply chain function is strategic, and supply chain executives need training in SCM processes. Tracey and Smith-Doerflein (2001) also stress the need for trainers to assist in the development of individuals in the area of supply chain management. The findings from the study by Gowen III and Tallon (2003, p. 32) propose “an interactive role of managerial and employee support to enhance the effectiveness of employee support to training and to mitigate the adverse effect of implementation barriers on the success of SCM practices.”

In order for an organisation/business to be successful in the competitive environment, there is a need to integrate an organisation’s network of a commercial relationships. Competition is no longer among separate businesses, but among groups of firms that are linked together in a chain for delivering customer value (Chandra, 2000).

Supply chain management is a strategy which can help an organisation achieve integration (Sadeh, Smith, & Swaminathan, 2003; Christopher & Ryals, 1999). The Global Supply Chain Forum defines SCM as “the integration of key business processes from end user through original suppliers that provide products, services, and information that add value for customers and other stakeholders” (Lambert, 2004; Chan & Qi, 2003). Lambert, Cooper and Pagh (1998, p.1) define the SCM concept as “integration of business processes from end user through original suppliers that provides products, services, and information that add value for customers.” Cox (2004) argues that SCM is a proactive relationship between a buyer and supplier, and the integration is across the entire SC. According to Handfield and Nichols, (2002, p. 8), SCM is “the integration and management of supply chain organisations and activities through cooperative organizational relationships, effective business processes, and high levels of information sharing to create high-performing value systems that provide member organizations a sustainable competitive advantage.” Basu and Wright (2008) go further and include the transfer of funds in some supply chains.

Furthermore, Zhou and Benton (2007, p. 1) found in their study on supply chain practice and information sharing that “both effective information sharing and effective supply chain practice are critical in achieving good supply chain performance.”

### **3.3 Problems of SCM**

Although there are many benefits of SCM reported in the literature, most SCM linked problems originate from either uncertainties or an inability to co-ordinate activities and partners (Turban, McLean, & Wetherbe, 2004). The bullwhip effect (demand variability) is one of the most common problems in supply chains discussed in the literature (Fransoo & Wouters, 2000; Basu and Wright, 2008). Small fluctuations in demand or inventory levels of the final company/organisation in the chain are reflected throughout the chain. Every company/organisation in the SC has limited or incomplete information regarding the needs of other members in the SC, and it has to respond with a disproportional

increase in inventory levels and subsequently an even larger fluctuation in its demand relative to others in the chain (Forrester, 1961).

Researchers (e.g., Forrester, 1961; Holweg & Bicheno, 2002) have indicated that the production peak can be significantly decreased by the flow of information directly from the customer to the manufacturer. The other problem in the SC is that some companies/organisations optimise their own performance without taking into consideration the benefits of the whole SC. The maximum efficiency of every chain does not accordingly lead to global optimisation (Gunasekaran, Patel & McGaughey, 2004).

### **3.4 Group purchasing**

Nollet and Beaulieu define a purchasing group “as a formal or virtual structure that facilitates the consolidation of purchases for many organisations. Consolidation is a procurement practice used to transfer to a central entity activities such as: bidding, supplier evaluation, negotiation, and contract management” (2005, p.12). Furthermore, Rozemeijer (2000) emphasise that a purchasing group normally provides extra power to the members of the group in their negotiations with suppliers. As a result, members get more favourable conditions than those which they would have gained individually. Young (1989) says that a purchasing group is an additional link in the supply chain. Nollet and Beaulieu (2005) support Young (1989).

Purchasing groups create savings of between 10 per cent and 15 per cent (Hendrick, 1997; Schneller, 2000). However, Scanlon (2000, p. 2) found that prices negotiated by purchasing groups “were not always lower and were often higher than prices paid by hospitals negotiating with vendors directly.” Similar finding was reported in Botswana (Daily News Online, 2005).

The literature indicates that there are many problems of using JIT and SCM, but little is known on the JIT supply chain in healthcare organisations in developing countries. This

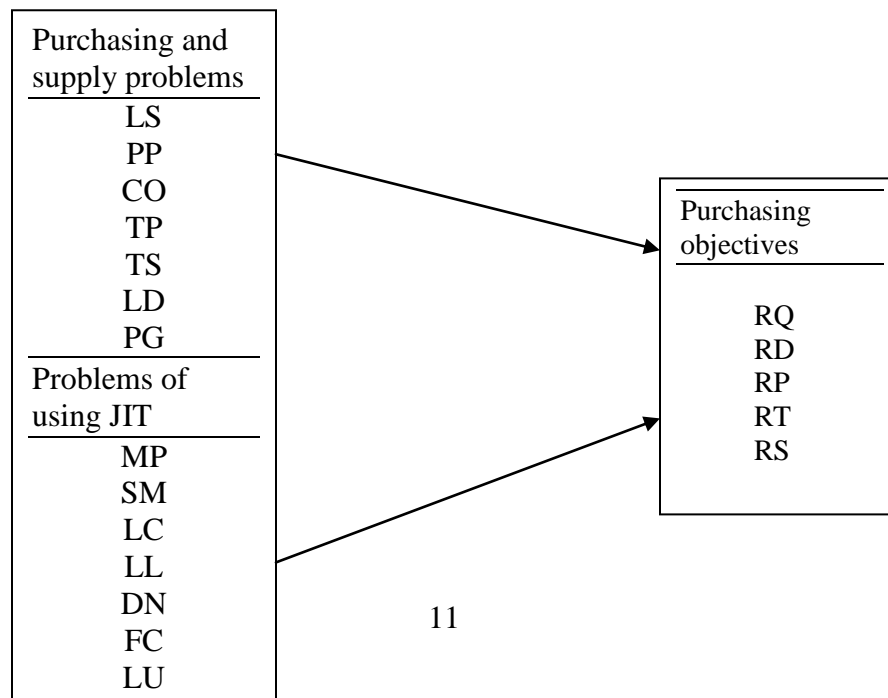
study provides the insight on the JIT supply chain practices in Botswana (a developing country).

#### 4.0 Conceptual model

Previous researches have provided insights on purchasing and supply problems (e.g., Schonberger, 1982; Hall, 1983; Turban et al., 2004; Fransoo et al., 2000; Basu & Wright, 2008). However, there is less information in the literature concerning models that have been developed for both purchasing and supply, and JIT problems and their impact on traditional purchasing objectives, with reference to the developing countries.

The interviews identified fourteen purchasing and supply (including JIT) problems that may influence the five traditional purchasing objectives. The conceptual model used in this research is depicted in Figure 2. The model shows purchasing and supply and JIT problems that can have influence on achieving purchasing objectives.

**Figure 2.0: Conceptual model: the impact of purchasing and supply and JIT problems on purchasing objectives**



**Note:** LS = Late supplies from stores  
PP = Purchasing planning is done by top management  
CO = There is no proper communication between purchasing section and stores  
TP = Purchasing staff are not trained in purchasing  
TS = Stores staff are not trained in store management  
LD = Late deliveries from the suppliers due to distance  
PG = There is no proper purchasing guidance or procedures  
MP = Management problems  
SM = Shortage of skilled manpower  
LC = Lack of reliable means of communication in rural areas  
LL = Long lead times (the time between ordering and receiving drugs)  
DN = Demand is not known or predictable  
FC = Financial constraints  
LU = Lack of reliable means of communication in urban areas  
RQ = The right quality  
RD = The right quantity  
RP = The right price  
RT = The right time  
RS = The right supplier.

## **5.0 Research methodology**

Data were collected using a triangulation of methods: interviews, a survey, and personal observation to identify critical purchasing and supply chain problems, problems of using JIT, and how they affect achievement of purchasing objectives. In addition, data were collected on whether JIT supply chain management can be implemented in Botswana to alleviate some of the critical supply chain problems.

Initially, interviews with several nurses were carried out to determine purchasing and supply problems and problems of using JIT in their hospitals/clinics in order to develop a survey questionnaire. The common themes identified from the interviews were used to develop the survey questionnaire. Some of the problems were identified during the visits at the clinics and hospitals. In addition, academics and nurses commented on the clarity and validity of the questionnaire. A survey was administered to a convenience sample of 70 nurses who studied purchasing and supply chain management (SCM) at the Institute of Development Management (IDM) in Botswana. A total of 60 usable responses were received representing 85.7% response rate.

## **6.0 Analysis**

The analysis of data from the survey was carried out using the descriptive statistics and the correlation matrix using SPSS version 17. Communality was used to determine the variables suitable for analysis (Table 1.0). Hair et al. (2006, p. 102) define communality as the “total amount of variance an original variable shares with all other variables included in the analysis.” Although Hair et al. (2006) recommend a minimum of .50 communality for each variable to be included in the analysis, the variable LD (late deliveries from the suppliers due to distance) with less than communality .50 was retained due to its importance in the analysis.

Table 1.0 Communalities

Variable	Purchasing and supply problems	Communality
LS = Late supplies from stores		0.895
PP = Purchasing planning is done by top management		0.921
CO = There is no proper communication between purchasing section and stores		0.921
TP = Purchasing staff are not trained in purchasing		0.580
TS = Stores staff are not trained in store management		0.881
LD = Late deliveries from suppliers due to distance		0.261
PG = There is no proper purchasing guidance or procedures		0.769
Variable	JIT problems	Communality
MP = Management problems		0.824
SM = Shortage of skilled manpower		0.572
LC = Lack of reliable means of communication in rural areas		0.645
LL = Long lead times (the time between ordering and receiving drugs)		0.715
DN = Demand is not known or predictable		0.801
FC = Financial constraints		0.905
LU = Lack of reliable means of communication in urban areas		0.761
Variable	Purchasing objectives	Communality
RQ = The right quality		0.931
RD = The right quantity		0.931
RP = The right price		0.931
RT = The right time		0.565
RS = The right supplier		0.768

Table 2.0: Correlation matrix of measures (1 = Disagree, 6 = Agree)  
 - Purchasing and supply problems

			Pearson Correlation Coefficients and significance levels						
Item		Mean, S.D	1	2	3	4	5	6	7
1	LS	Late supplies from the stores (3.283, 0.454)	1						
2	PP	Purchasing planning –done by top management (2.833, 0.376)	-.116	1					
3	CO	There is no proper communication-purchasing and stores (2.833, 0.376)	-.116	1.00**	1				
4	TP	Purchasing staff are not trained in purchasing (2.117, 0.324)	.117	-.534**	.413**	1			
5	TS	Stores staff are not trained in stores management (1.917, 0.279)	-.078	.027	.027	.110	1		
6	LD	Late deliveries from suppliers due to distance (1.750, 0.437)	.107	-.258*	-.258*	.210	-.035	1	
7	PG	There are no proper purchasing procedures (1.667, 0.681)	.256*	-.552**	-.552**	.564**	.298*	.228	1

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

\* Correlation is significant at the 0.05 level (2-tailed)

Table 2.0: Correlation matrix of measures (Cont.) 1 = Not very important,  
 - Purchasing objectives 6 = Very important

			Pearson Correlation Coefficients and significance levels						
Item		Mean, S.D	1	2	3	4	5	6	7
8	RQ	The right quality (5.90, 0.303)	-.160	.000	.000	-.052	-.101	.449**	.082
9	RD	The right quantity (5.9, 0.303)	-.160	.000	.000	-.052	-.101	.449**	.082
10	RP	The right price (5.9, 0.303)	-.160	.000	.000	-.052	-.101	.449**	.082
11	RT	The right time (5.75, 0.437)	.021	.052	.052	.090	.104	.111	.228
12	RS	The right supplier (5.833, 0.376)	-.116	.040	.040	.023	.189	.258*	.243

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

\* Correlation is significant at the 0.05 level (2-tailed)

Table 2.0: Correlation matrix of measures (Cont.) 1 = Not very important,  
- Purchasing objectives 6 = Very important

Pearson Correlation Coefficients and significance levels				8	9	10	11	12
Item			Mean, S.D					
8	RQ	The right quality	(5.90, 0.303)	1				
9	RD	The right quantity	(5.9, 0.303)	1.00**	1			
10	RP	The right price	(5.9, 0.303)	1.00**	1.00**	1		
11	RT	The right time	(5.75, 0.437)	.577**	.577**	.577**	1	
12	RS	The right supplier	(5.833, 0.376)	.745**	.745**	.745**	.775**	1

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

\* Correlation is significant at the 0.05 level (2-tailed)

Table 2.0 indicates the results of the correlation matrix regarding the impact of purchasing and supply problems on purchasing objectives. Late deliveries from the suppliers due to distance (LD) have significant impact on achieving the purchasing objectives: the right quality (RQ), right quantity (RD), right place (RP), and the right supplier (RS). LD is not significant for the right time (RT).

Table 3.0: Correlation matrix of measures (1 = Not serious, 6 = Serious)  
- Problems of using JIT

Pearson Correlation Coefficients and significance levels										
Item			Mean, S.D	1	2	3	4	5	6	7
1	MP	Management problems	(3.917, 0.279)	1						
2	SM	Shortage of skilled manpower	(3.367, 0.52)	.098	1					
3	LC	Lack of reliable communication in rural areas	(3.133, 0.503)	.081	-.320**	1				
4	LL	Long lead times	(3.0, 0.611)	.199	-.160	.055	1			
5	DN	Demand is not known	(2.167, 0.642)	-.110	-.339**	.402**	-.173	1		
6	FC	Financial constraints	(1.967, 0.367)	-.028	.065	.024	.151	.096	1	
7	LU	Lack of reliable means of communication in urban areas	(1.083, 0.279)	.091	.137	-.201	-.100	.110	.028	1

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

\* Correlation is significant at the 0.05 level (2-tailed)

Table 3.0: Correlation matrix of measures (Cont.) 1 = Not very important,  
- Purchasing objectives 6 = Very important

Pearson Correlation Coefficients and significance levels				1	2	3	4	5	6	7
Item			Mean, S.D							
8	RQ	The right quality	(5.967, 0.181)	-.056	-.048	-.136	.153	.049	-.017	.056
9	RD	The right quantity	(5.933, 0.251)	-.081	.061	-.330**	.110	-.245	-.024	.081
10	RP	The right price	(5.9, 0.303)	.101	.129	-.468**	.275*	-.523**	-.031	.101
11	RT	The right time	(5.75, 0.437)	.104	-.112	-.077	.191	-.151	-.053	-.104
12	RS	The right supplier	(5.833, 0.376)	.189	-.021	-.239	.222	-.234	-.041	.135

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

\* Correlation is significant at the 0.05 level (2-tailed)

Table 3.0: Correlation matrix of measures (Cont.) 1 = Not very important,  
- Purchasing objectives 6 = Very important

Pearson Correlation Coefficients and significance levels				8	9	10	11	12
Item			Mean, S.D					
8	RQ	The right quality	(5.90, 0.303)	1				
9	RD	The right quantity	(5.9, 0.303)	.695**	1			
10	RP	The right price	(5.9, 0.303)	.557**	.802**	1		
11	RT	The right time	(5.75, 0.437)	.322*	.463**	.577**	1	
12	RS	The right supplier	(5.833, 0.376)	.415**	.598**	.745**	.745**	1

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

\* Correlation is significant at the 0.05 level (2-tailed)

Table 3.0 indicates the results of the correlation matrix regarding the impact of JIT problems on purchasing objectives. Lack of reliable communication in the rural areas (LC), have significant impact on achieving the purchasing objectives: the right quantity (RD) and the right price (RP). Long lead times (LL) and demand not known (DN) have significant impact on achieving the purchasing objective the right price (RP).

## **7.0 Discussion of results**

### **7.1 Purchasing and supply problems**

An effective and efficient just-in-time supply chain management function in the healthcare system depends on the management's efforts to solve purchasing and supply problems facing healthcare sector in developing countries. These problems need to be solved first before the healthcare sector organisations can achieve their purchasing objectives in the supply chain.

The results show that the respondents are concerned with existing purchasing and supply problems (See Table 4.0). The respondents rated the problems in order of severity as follows:

- (1) Late supplies from the stores (mean score 3.3).
- (2) Purchasing planning is done by the top management (or the boss) only (mean score 2.8).
- (3) There is no proper communication between purchasing section and stores (mean score 2.8).
- (4) Purchasing staff are not trained in purchasing (mean score 2.1).
- (5) Stores staff are not trained in store management (mean score 1.9).
- (6) Late deliveries from suppliers due to distance (mean score 1.8).
- (7) No proper purchasing guidance or procedures (mean score 1.7).

**Table 4.0**

<b>Purchasing and supply problems</b>		<b>Mean</b>	<b>Std. Deviation</b>	<b>Rank</b>
LS	Late supplies from stores	3.283	0.454	1
PP	Purchasing planning is done by top management	2.833	0.376	2
CO	There is no proper communication between purchasing section and stores	2.833	0.376	3
TP	Purchasing staff are not trained in purchasing	2.117	0.324	4
TS	Stores staff are not trained in store management	1.917	0.279	5
LD	Late deliveries from suppliers due to distance	1.750	0.437	6
PG	There is no proper purchasing guidance or procedures	1.667	0.681	7

**Scale:** 1 = Disagree 6 = Agree.

The major problem is late supplies from the stores and the least problem is no proper purchasing guidance or procedures (there was an effort to improve the situation). The late medical supplies from hospital or clinic store is pointed out as the first problem by 50 percent of the respondents. Late delivery of drugs and other medical requirements affects nurses' performance in providing healthcare services to patients in the clinics and hospitals. Respondents pointed out transport as a major problem affecting delivery of medical supplies to clinics in the rural areas.

## **7.2 Problems for using just in time in healthcare organizations**

Each respondent was asked to rate the problems of using just in time in healthcare organisations. Respondents were asked to answer on the six-point Likert scale ranging from 1 (not serious) to 6 (serious). The results show that respondents are concerned with problems to adopt just in time supply chain in healthcare organisations (Table 5.0). The respondents rated the problems in order of seriousness as follows:

- (1) Management problems (mean score 3.9).
- (2) Shortage of skilled manpower (mean score 3.4).
- (3) Lack of reliable means of communication in rural areas (mean score 3.1).
- (4) Long lead times (the time between ordering and receiving drugs) (mean score 3.0).
- (5) Demand is not known or predictable (mean score 2.2).
- (6) Financial constraints (mean score 2.0).
- (7) Lack of reliable means of communication in urban areas (mean score 1.1)

**Table 5.0**

<b>Problems of using JIT</b>		<b>Mean</b>	<b>Std. Deviation</b>	<b>Rank</b>
MP	Management problems	3.917	0.279	1
SM	Shortage of skilled manpower	3.367	0.520	2
LC	Lack of reliable means of communication in rural areas	3.133	0.503	3
LD	Long lead times	3.000	0.611	4
DN	Demand is not known or predictable	2.167	0.642	5
FC	Financial constraints	1.967	0.367	6
LU	Lack of reliable means of communication in urban areas	1.083	0.279	7

**Scale:** 1 = Disagree 6 = Agree.

The most serious problem reported by the respondents is regarding management problems and the lower level problem is lack of reliable means of communication in urban areas. The management problems are pointed out as a serious problem by 50 percent of the respondents, especially problems related to communication between purchasing section and stores, purchasing planning, and late supplies from the stores. The respondents indicated that cross-sectional relationships and team spirit is at a minimum level in many clinics and hospitals. From the interviews, the respondents

revealed that although there are problems in using the JIT, the concept of JIT supply chain can be useful in the clinics and hospitals operations. In the interviews conducted by the author, it was revealed that apart from the problems in using JIT, the respondents believe JIT supply chain management has potential benefits to the clinics and hospitals.

### **7.3 Rating of purchasing objectives in clinics and hospitals**

Each respondent was asked to rate the importance of the five traditional purchasing objectives in healthcare organisations: the right quality, the right quantity, at the right time, the right supplier, and at the right price. Respondents were asked to answer on a six-point Likert scale, ranging from 1 (not important) to 6 (very important). The results show how the personnel involved in the supply chain value the purchasing objectives in their organisations in order to facilitate the implementation of just in time supply.

The results show that the respondents in hospitals and clinics consider all the purchasing objectives are very important. The following factors, arranged in order of importance reflect the recognition of the key traditional purchasing objectives:

- (1) The right quality (mean score 5.9).
- (2) The right quantity (mean score 5.9).
- (3) The right price (mean score 5.9).
- (4) The right time (mean score 5.8).
- (5) The right supplier (mean score 5.8).

The highest mean scores are reported for the right quality, the right quantity, and at the right price (90 percent of the respondents rated the objectives very important on a six-

point Likert scale). Only 80 percent of the respondents indicated low mean scores (5.8) for the right time and the right supplier objectives. Therefore, the results show that most hospitals and clinics put more value on quality, quantity and price rather than the right time and supplier in the supply chain. The low rating of time and supplier by the respondents supports the last three problems highlighted as major purchasing and supply problems in clinics and hospitals. It is not easy to implement just in time supply chain if time and supplier, which are crucial factors in using JIT are given less weight in clinics and hospitals.

#### **7.4 Purchasing and stores personnel performance**

The surveyed purchasing and stores personnel in the healthcare organisations have different qualities although they obtained the same mean score of 1.6. The rating by the respondents showed the rating of good was given by 60 percent of the respondents for both purchasing and stores personnel. Only 40 percent of the respondents rated purchasing and stores personnel as “very good” in performing supply chain management activities in the hospitals and clinics.

The result supports the problems three, four, and five mentioned as major purchasing and supply problems in the clinics and hospitals. The performance rated “good” for purchasing and stores personnel provide evidence that the respondents are concerned with purchasing and stores issues in their healthcare organisations. The low level of performance can hinder the implementation of just in time supply chain in healthcare sector.

## **7.5 Lessons learned**

This paper highlights JIT supply chain practices in developing countries, with particular reference to the public healthcare sector in Botswana. The supply of medical drugs from the government owned central medical store has not been done effectively to meet the requirements of the hospitals and clinics. This forced some of the town councils to use private suppliers of medical drugs, who are expensive and can drain their medical supplies budget (Daily News Online, 2005). However, group purchasing by the central medical store provides potential benefits in reducing costs, only if the central medical store is professionally managed.

The use of a centralised source of supply needs to be managed effectively and efficiently. There is a need to have more supply chain professionals to provide leadership in operating the Botswana's modern semi automated supplies store so that they can provide services to the hospitals and clinics at the right time, with the right quantity and quality, at minimum cost. Quick response to the requirements of the hospitals and clinics will increase productivity, and enhance service level to the patients.

The importance of JIT supply chain management in the public healthcare sector can be enhanced by top management of the central medical store and well trained purchasing and supply personnel, who can manage the supply chain. The need for trained personnel in supply chain management supports the findings in the literature (e.g., Msimangira, 2003; Gowen III & Tallon, 2003).

## **8.0 Conclusions and recommendations**

This study presents findings about the just in time supply chain in healthcare organizations in developing countries, with particular reference to Botswana. The responses in this study propose that the JIT supply chain philosophy could be used in developing countries like Botswana in order to improve customer focus, and meet the medical requirements of hospitals and clinics. The major problems in purchasing and supply (e.g., late deliveries of medical supplies from the suppliers), and problems of using JIT (e.g., lack of reliable communication in the rural areas, long lead times, and unknown demand) in healthcare organisations in Botswana must be solved first if the JIT supply chain is to work effectively and efficiently. After solving the JIT supply chain problems, the quality of service in hospitals and clinics can be improved significantly. Supply chain management can help an organisation achieve integration (e.g., Cox, 2004, Sadeh et al., 2003, Christopher & Ryals, 1999) in providing good customer service.

In addition, personnel involved in supply chain activities must be trained in supply chain management and just in time in order to offer high quality services to patients in the hospitals and clinics, and at the same time minimize the operational costs. Also, there must be a good co-ordinated supply chain design, to facilitate the just in time provision of services. That is, there is a need to have efficient flow of medical drugs and other healthcare requirements from the central medical stores (the source) to the hospitals and clinics. In order for JIT to function properly, first the resources should be available and employees working in the area of supply chain should be well trained and motivated to ensure higher productivity. Before adopting effective JIT supply chain in healthcare, the

buyer (central medical store) should first carry out negotiations with potential (local and overseas) suppliers for cooperation and support so that supply delays can be avoided. Healthcare organisations deal with emergencies, and therefore, medical drugs must be available when needed not earlier or later, but just in time to be used by the customers (doctors, nurses, and patients).

The continuous training of personnel in the area of just in time supply chain will help to solve the problems. The facilities required (such as transport) should be available when needed. Transport must be available to deliver medicines and other supplies to different health centres in urban and rural areas at the right time. In order to improve the level of supply chain management understanding, the Ministry of Health (Botswana) and the central medical stores should continue training their purchasing and supply personnel at the Institute of Development Management (IDM), Botswana, the Botswana Institute of Administration and Commerce (BIAC), and overseas to acquire necessary skills and knowledge in supply chain management. In addition, there is a need to use good examples of early adopters of JIT supply chain in public healthcare sector from the developed countries, as exemplars.

The introduction of the Chartered Institute of Purchasing and Supply (CIPS, U.K.) branch in Botswana, and the continuous government's support to improve the level of purchasing and supply management skills in the public sector, show that the future is bright for Botswana in reducing procurement costs and improve service delivery in the healthcare sector. Since the Graduate Diploma in Purchasing and Supply was introduced

at IDM in 1994, the number of active members of CIPS increased tremendously to over 430 by 2005 (CIPS, 2005).

The responses show that the JIT supply chain philosophy could be used in developing countries like Botswana in order to improve customer focus, and meet the medical requirements of hospitals and clinics.

### **9.0 Study limitations and future research**

This paper has provided an insight for further research in Botswana and other developing countries. An in depth study of JIT supply chain in the public healthcare sector, and the behaviour of managers in managing the medical drugs supply chain is required to determine hard evidence of the level of JIT supply chain practices in the healthcare sector, using a large sample. The major limitation of this paper is that the data were collected from a small convenience sample of nurses in Botswana. A study on a wider scale, including patients, nurses, and doctors in the public hospitals and clinics in developing countries may provide different results.

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