

E-Procurement: A Case Study about the Health Sector in Turkey

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Abstract

E-procurement is a deriving benefit attained from technological enhancements rather than using traditional a paper based method in procurement operations. The main objectives of this study are observing the usage ratio of technological equipment in operations which are closely related with e-procurement activities and potential methods for improving the general performance in hospitals. A case study strategy is taken as a research strategy for attaining information from the investigated hospitals and data collection methods of semi structured interviews and nonparticipant observations are used. From the perspective of e-procurement, more technological tools can be used for activities in pharmacies, and drug flow from doctor to patient can be improved. Application of the proposed advice given to pharmacies operating in hospitals can ensure significant time and money savings without too much time or financial investment. Presenting the situation of e-procurement adoption for pharmacies located in Turkey can help academics and practitioners to see the general picture for e-procurement in developing countries.

Key Words: E-procurement, Supply Chain Health Sector, Case Study, Pharmacies

1. Introduction

Supply Chain Management (SCM) is crucial for firms both operating within the service and manufacturing sectors. Previously, when competition was not as fierce as is now, it was believed that competition only existed between companies. However, in today's world not only are companies competing but supply chains are too. This leads to changes in the profitability perception as supply chain profitability supersedes individual firm profitability. Today's firms endeavor to maximise mutual profits with their supply chain members since having strong partners helps firms to increase their operations' efficiency. In order to achieve complete success for supply chain members, the relations between these stakeholders should be closer than before.

In a supply chain the main goal is to meet customers' needs and expectations with as little cost as possible; in other words, working with a supply chain that offers the lowest cost with the most favourable service is vital for business entities. For the sake of performing these tasks, there are cycles in a supply chain between each successive stage and each cycle involves purchase and sale activities (Chopra & Meindl, 2007). The customer order cycle between the customer and retailer or the procurement cycle between the manufacturer and supplier could be given as examples of these cycles. In each cycle there are product, fund and information flows between the two members of this cycle. Undoubtedly, giving the same service with a low cost necessitates effective and conscious management of product, fund and information flows between supply chain members. At this point, increasing communication with emergency technology assists firms in operating these flows. Hence, owing to performance, improvements could be acquired; since compared to the past, product, fund and information are transformed more rapidly and cheaply. Especially the global use of the internet supports firms' relations with their suppliers.

As electronic commerce (EC) develops in the business world, the purchase process is speeded up between supply chain members, the fund transfer is simplified, supplier bases expand, paperwork for transactions is reduced and possible order errors are eliminated (Min & Galle, 2003). Also, with more effective stock level management inventory costs could be reduced (Zheng et al., 2006) and ordering costs could be decreased by technological improvements in purchasing (Ageshin, 2001). Besides having several aforementioned benefits, technology usage in purchase activities is inevitable with time, since distances between firms are increasing with globalization which provides global market opportunities (Gunasekaran et al., 2009) and the number of suppliers' are increasing with the expanding complexity of products and the growing use of outsourcing. Furthermore, technology usage ratios in procurement activities has come to play a pivotal role in determining the performance of firms, since the emergence of online purchasing has become an interesting and special performance indicator (Batenburg, 2007).

Although online purchasing is a significant issue for real firms operating within different sectors, researchers have not given much attention to this area (Ronchi et al., 2010). In this study, e-purchase (online purchasing, e-procurement (Batenburg, 2007)) activities of pharmacies' of three private hospitals located in Ankara, Turkey are investigated. The main aims of this exploration include observing the situation of technological equipment usage in operations, which are closely related with e-procurement, e-procurement adoption and potential ways for improving the general performance in the above-mentioned hospitals.

2. E-Procurement

For firms, e-procurement means the integration of technological tools into purchasing activities taking place within supply chains while performing their operations. In other words, e-procurement is a deriving benefit attained from technological enhancements rather than using traditional a paper based method in procurement operations. In a more detailed explanation, e-procurement gains the advantage of EC to determine potential supply alternatives, to purchase goods and services, to transfer the prices of these goods and services and to interact with suppliers (Min & Galle, 2003).

E-procurement utilizes the internet and other web based technology in several forms (Gebauer & Segev, 2001):

- Supplier online selling accelerates access to up-to-date product data, pricing and delivery information.
- Web- and Internet-based EDI-applications provide an efficient and effective way to automate the exchange of information between sellers and buyers.
- Desktop purchasing systems (DPS) automate the buying operations.
- Online tools to publish requests for quote (RFQ) and requests for proposal (RFP) for supporting procurement activities.
- Online auctions assist to determine purchase prices and conditions for strategic and operational activities.
- The Internet is used for establishing online market places, so large numbers of buyers and sellers are brought together.
- A number of specialized applications such as catalog building, application integration, auction engines, payment and fulfillment services are available for use.

Many researchers state the benefits of e-procurement in literature which are categorized and presented in Table 1.

Table 1. Benefits of E-procurement

POTENTIAL BENEFITS TO FIRM	LITERATURE SUPPORTING
Reduce order cycle times	Min&Galle, 2003; Tatsis et al., 2006; Gunasekaran&Ngai, 2008; Panayiotou et al., 2004; Liu et al., 2011; Davila et al., 2003; Mettler&Rohner, 2009; Roche, 2001 ;
Simplify purchase payment	Min&Galle, 2003;
Expand supplier bases	Min&Galle, 2003; Moon, 2005;
Reduce paperwork	Min&Galle, 2003; Gunasekaran&Ngai, 2008; Davila et al., 2003; Mettler&Rohner, 2009; Roche, 2001;
Eliminate order errors	Min&Galle, 2003; Mettler&Rohner, 2009; Zheng et al., 2006; Davila et al., 2003; Gebauer &Segev, 2001;
Inventory reduction	Min&Galle, 2003; Tatsis et al., 2006; Panayiotou et al., 2004; Zheng et al., 2006; Ageshin, 2001; Liu et al., 2011; Mettler& Rohner, 2009; Roche, 2001;
Productivity and/or service improvement	Gunasekaran et al., 2009; Moon, 2005; Panayiotou et al., 2004; Ageshin, 2001; Muffatto&Payaro, 2004
Save time	Moon, 2005; Mettler&Rohner, 2009; Gunasekaran&Ngai, 2008; Kim&Shunk, 2004; Gebauer &Segev, 2001;
Reduce cost	Moon, 2005; Tatsis et al., 2006; Mettler&Rohner, 2009; Smith&Correa, 2005; Gunasekaran&Ngai, 2008; Panayiotou et al., 2004; Zheng et al., 2006; Kim&Shunk, 2004; Ageshin, 2001; Liu et al., 2011; Davila et al., 2003; Mettler&Rohner, 2009
Decentralize procurement management	Moon, 2005;
Decrease prices, price advantages	Tatsis et al., 2006; Panayiotou et al., 2004; Ageshin, 2001; Liu et al., 2011; Davila et al., 2003; Gebauer &Segev, 2001;
Improved communication and collaboration with suppliers	Tatsis et al., 2006; Gunasekaran&Ngai, 2008; Panayiotou et al., 2004; Ronchi et al., 2010; Liu et al., 2011; Mettler&Rohner, 2009 ; Muffatto&Payaro, 2004; Roche, 2001;
Improved planning and control	Tatsis et al., 2006;
Improved effectiveness of purchasing process	Panayiotou et al., 2004; Davila et al., 2003;
Reduction of purchase department size and number of functional areas involved in purchasing process	Ronchi et al., 2010; Davila et al., 2003;
Allowing the purchasing department to concentrate on more strategic tasks	Gebauer &Segev, 2001;

With the help of an e-procurement system, buyers can easily follow products' prices and specifications purchased from suppliers, and they can submit their orders to suppliers by using electronic forms (Liu et al., 2011). However, although e-procurement serves as an accelerator and a tool to assisting in simplifying the purchasing process between buyers and sellers, there are some barriers for adopting this technological system. These barriers are (Davila et al., 2003):

Internal business risk: Adopting e-procurement system in a firm necessitates the integration of this system with another information infrastructure including systems such as accounting, human resources, asset management, inventory management, accounts payable, production planning, and cash management systems.

This means making investment only in purchasing system is not sufficient for deriving benefits; besides, this would cause undesirable results such as lack of information, dual entries leading to complications, and increasing time consumptions.

External business risk: Adopting an e-procurement system and integrating it with information infrastructure of a particular firm may not guarantee the success of the new process. Since all purchasing activities normally have two sides, adjusting only their own operations in the firm could be insufficient. The suppliers which are known or unknown by the firm constitutes the other side of the purchasing process, and they have to be well organized in terms of performing e-procurement transactions. These suppliers have to offer sufficient catalogue choices to satisfy the requirements of their customers and necessary update transactions for e-catalogues should be made on time. Otherwise, the expected benefits from e-procurement could be diminished, vanished totally or turned into a negative impact for the firm. For instance, if the suppliers of a company do not have the same communication standards with the company, tapping into the benefits of e-procurement is not possible (Min & Galle, 2003).

Technology risk: As mentioned earlier, there are many e-procurement technologies which could be used by firms. The problem here is finding the most suitable one for the firm, since every technology has its own specifications. For instance, Internet Electronic Data Interchange (EDI) provides more rapid, frequent data transfer and security potential; however, the cost of setting up an EDI system is also more than setting up the internet (Min & Galle, 2003). If the transactions made by a company are highly dedicated and proprietary, EDI may well suit that company; nonetheless, if the aim of the company is only searching and procuring supply alternatives, the Internet may be the right choice (Min & Galle, 2003). Hence, the e-procurement system should be determined according to the needs of companies.

E-procurement process risk: E-procurement transactions are made through electronic forms which are transferred between buyers and sellers. In other words, everything is dependent on electronic data interchange. Therefore, the security of this system has to be maintained by the two parts of this commerce. Unauthorized malicious interventions have to be detected and counteracted by the firm.

3. Literature Review

In literature that there are several studies about the adoption of e-procurement in companies is observed. In this section, the studies which are mostly related to our study are evaluated, discussed and correlated with this study. The study (Mettler & Rohner, 2009), which investigates the purchasing processes in three hospital pharmacies located in Switzerland, shows that inspected pharmacies are still encountering problems such as paper shuffling, multiple product handling activities, excessive inventory carrying costs, lengthy order cycle times, data and process quality issues and poorly developed links to suppliers. According to the researchers (Mettler & Rohner) of that study, implementation of Radio Frequency Identification (RFID) technology, bar coding systems, Computerized Physician Order Entry (CPOE)¹, Automated Dispensing System (ADS)², Unit Dose Dispensing System (UDDS)³, Supplier Relationship Management Systems (SRM)⁴ (e.g. e-auctions, e-marketplaces, supplier self-services) and EAI⁵ (e.g. Hospital Information Systems (HIS), Pharmacy Information System (PIS), materials management systems, desktop purchasing tool) could provide benefits to the aforementioned pharmacies.

Besides, in this study it is claimed that in order to efficiently implement the recommended technologies, purchasing activities should be consolidated, laborious or precarious tasks such as check prescription, search for supplier should be reduced or at least complemented by consistency checks like contraindication alert, out of stock warning and effectiveness of the activities should be improved. It is possible to declare that the general aim, which is exploring the current adoption of e-procurement technologies in hospital pharmacies, of this study and ours are almost the same. However, the application places of countries and years of the studies are different, so revealing the place, country and time effects are major disparities between their study and ours.

¹ Computerized Physician Order Entry: It is a process of physician's electronic ordering.

² Automated Dispensing System: Automates the drug dispensation process.

³ Unit Dose Dispensing System: It is used for preparation of drugs in pharmacy (typically for non-fluid medicines such as pills) (Mettler and Rohner, 2009)

⁴ Supplier Relationship Management Systems

⁵ Enterprise Application Integration: It is used for integrating intra and inter-organizational systems (Mettler and Rohner, 2009)

Also, there are differences in the investigation process of e-procurement adoption in hospital pharmacies. In this study, in addition to interviews with managers of the pharmacies, observations were also made. The other study (Zheng et al., 2006) conducted in a UK health sector investigates the supply chains of the following products: orthopedic footwear, cardiac stents, intravenous fluids and blood tubes. The results of this study show that although e-mails and auto-faxes are used in procurement activities among supply chain members, the telephone ordering seems a dominant practice for communicating with suppliers. In another study (Gunasekaran & Ngai, 2008), divergent sectors are taken into account and a theoretical framework for the adoption of e-procurement in an organization is developed. Major components of this framework are: perceived benefits of e-procurement, perceived barriers of e-procurement, critical success factors of e-procurement adoption and perceived organizational performance with e-procurement. By using the developed theoretical framework, e-procurement adoption levels of companies from divergent areas located in Hong Kong are analyzed. According to the remarkable results of the study, 79% of the respondent companies have not implemented e-procurement systems before; however, 77% of them believe that e-procurement is important. Main reasons for not implementing e-procurement before are: Customers are satisfied with current practices (28%), Lack of adequate resources (15%), Not perceived as an advantage at all (15%), Security concerns (15%) and too costly to implement (15%).

Another striking result of this study is, 67% of companies believe that successful e-procurement implementation can improve long term organizational performance, whereas 35% expect short term performance improvement from an e-procurement adoption. This means, most companies see e-procurement as a long term investment for their entities. Moreover, this study indicates that top management support and train people on information technologies that are essential for the success of e-procurement adoption in organizations. After this study, Gunasekaran et al. (2009) added the "current status and readiness of a company for e-procurement" component to the theoretical framework suggested by Gunasekaran and Ngai and by using this modified version, they studied the current status of e-procurement in small and medium sized enterprises (SMEs) located in the South coast of Massachusetts. The results of this study show that the benefits of e-procurement were not perceived by respondent companies (only 33% of respondents believed e-procurement is important or extremely important). As a result, this study reflects the very low usage ratio of e-procurement among these companies as being very low. It promotes the understanding of a positive impact of e-procurement on organizational performance, costs, prices, market access, information exchange with suppliers, customer service, and business growth which it recommends to companies.

In the study conducted by Min and Galle (2003), different hypotheses regarding e-procurement are developed and tested over 656 companies from divergent sectors. The most remarkable hypotheses that are supported at a significance level of $\alpha = 0.05$ are "Firms that are in information intensive industry sectors are more likely to adopt e-purchasing compared to firms in less information intensive industry sectors", "The larger the number of purchasing employees, the greater the chance the buying firm will become the adopter of e-purchasing", "The buying firm who recognizes the managerial benefits of EDI or the internet is likely to adopt one or the other". This means, the sector in which companies operate, the number of employees working in purchasing activities and consciousness in terms of e-procurement advantages could affect the e-procurement tools usage ratios. However, in their study, it was found that the number of suppliers that the respondent companies had, showed there was no relation with e-procurement adoption chances' of those companies. So, it could be claimed that the technological infrastructure levels of supplier's are more serious than the magnitude of its supplier bases for a company, since having lots of suppliers lacking e-procurement systems does not express anything for the company. The public sector also tries to use e-procurement tools to improve their overall quality in purchasing transactions. To encourage e-government, many public managers have pursued e-procurement for becoming smart buyers and reaching a more qualified and accountable procurement system (Moon, 2005). Moon (2005) made a longitudinal study, since in the aforementioned study state governments' varying e-procurement tools usage ratios were asked both in 1998 and 2001.

According to the results of this study, between 1998 and 2001 the e-procurement tools' usage ratios have increased, for instance, posting contract award information on the web increased from 75% to 89%; electronic ordering increased from 45% to 68%; accepting digital signature for procurement documents increased from 9% to 15%. Consequently, this study shows the increasing usage of e-procurement systems could only be seen by analyzing the three year period. However, e-procurement adoption in companies requires higher levels of responsiveness, since these new technologies enable inventory reduction (Ageshin, 2001).

It is also mentioned in a study done by Vaidyanathan and Devaraj (2008) concerning e-procurement performance analysis, that meeting orders on time has greater impact on satisfaction than meeting orders accurately. So, after adopting e-procurement, the whole system should be managed cautiously in order to avoid shortage problems. Yu et al. (2008) state that if e-procurement is properly applied, it could provide benefits, otherwise it can cause damage to companies. Ronchi et al. (2010) have determined the six major benefits of e-procurement and prepared a classification type. Order cost, administrative cost, lead time opportunity cost and opportunity cost of capital are used to calculate financial performance and decentralization, while transparency, control, maverick-buying reduction, supply-base rationalization are used to assess organizational performance. By making such a classification, they try to assess the value of adopting e-procurement in companies.

4. Research Methodology

In this study, three private hospitals' pharmacies are selected for evaluation of e-procurement application levels and both benefits and barriers for implementing this technology in procurement activities are observed. These aforementioned hospitals, which are named A, B and C, are located in Ankara. Only pharmacies are taken into consideration among other departments of the hospitals. It has two main reasons; one of them is to concentrate on one department and to carefully analyse data which could provide more useful results. The other reason is pharmacies play a critical role in hospitals for pursuing operations in a well organised manner without delays. Besides, in this study, only drug procurement is observed, since the most critical and necessary among purchases for health services are drugs.

In this study a case study strategy is utilized. Two different data collecting methods are used to get information from these hospitals. These methods are semi structured interviews and nonparticipant observations. Firstly, as a pilot study a semi structured interview was done with a pharmacist who was responsible for all purchasing operations in the pharmacy of hospital A. In this interview the basic point about the role of pharmacies in hospitals, general operations conducted and procurement activities held in hospital pharmacies are determined. After this semi structured interview, a total of 10 hours of observations were made at different working hours in hospital A within a month. The aim of these observations were to fully understand the hospital pharmacy's working environment. After forming a base with a semi structured interview and observations, the other semi structured interviews were made with the personnel responsible for procurement for hospital pharmacies A, B and C. Then, the situation regarding procurement activities in the aforementioned hospital pharmacies are presented individually and a comparison between them are given.

4.1. Pharmacy of Hospital A

The drugs for all inpatients, who are receiving treatment in different wards, are obtained from pharmacy and ward stocks. Replenishment of ward stocks is made by the pharmacy on different times. The drug procurement of the hospital is made by the pharmacy. The replenishment times of drugs change according to the type of drug. There is a Hospital Computer Program (HCP) which has been designed by the information technology department of the hospital. The HCP has different specifications and is used among all departments of the hospital for different purposes. The pharmacy can follow stock levels for drugs by using the HCP. There are safety levels for all drugs. Because of demand explosions, pharmacy can sometimes face drug shortages. At these times, additional orders are given and procured quickly. The process of additional order procurement is presented in Figure 1.

It is mentioned above that there are safety stock levels for all drugs and with the help of the HCP the pharmacy can keep track of this data. Generally, except during demand explosion times, replenishment of drugs are supplied in bulk. However, it resembles the process of additional order placement. The only difference between this process and the previously mentioned one that supplier searching is made in a more detailed manner, since there is no demand pressure for drugs at these times. Therefore, communication is conducted with more suppliers and price proposals are evaluated in a more detailed manner. This way, additional order placement times and price advantages can be achieved for general procurement. Like the additional order placement process, the same technological tools including e-mail, telephone, fax and e-catalogues are used in the general procurement process. The technological tools and the purpose of their use are presented in Table 2. Hence, the pharmacy uses the internet to communicate with suppliers via e-mail, following prices, discount rates and up to date information regarding drugs via e-catalogues.

4.2. Pharmacy of Hospital B

Pharmacy and wards stocks provide necessary drugs for inpatients. However, the stocks kept in wards are low. There are two types of procurement activities in this pharmacy. One of them is general procurement, the other one is additional procurement. General procurement is conducted from one center, although this hospital has five other branches located in other cities of Turkey. This center takes the expected orders from the pharmacies of these five hospitals and makes bulk purchasing. According to the received orders from the pharmacies, quarterly bids are made with the potential suppliers. The supplier who proposes the highest commercial discount to the hospital is given the opportunity of trading with this hospital. During these bids, all correspondence with suppliers is maintained by mail, e-mails and faxes.

The pharmacy places its orders to the center once a week by e-mail or by telephone. The general aim of the pharmacy is to maintain operations successfully by keeping as little stock as possible. Since the holding costs of keeping drug stock is considerably high for the hospital. Therefore, the pharmacy endeavors to determine drug levels optimally, not too much and not too low, only as much as needed. However, since the pharmacy cannot know the exact amount of drug demand, sometimes drug shortages may occur. In these circumstances, additional procurement is made in order to meet the excess drug demand. The process of additional order procurement is presented in Figure 1.

The pharmacy can follow its inventory by using a stock control program called Bilmek. With the help of this program, the pharmacy can see the stock levels of drugs in pharmacy and in each ward at any time. Moreover, a stock count is made quarterly for confirmation.

Table 2. The Technological Tools and Their Usage Aims

Internet
Following prices from General Directorate of Drug and Medicine's (GDDM) web site.
Following discount rates of suppliers from e-catalogues.
Communicating with suppliers via e-mail.
Reaching up to date information regarding drugs via RX Media Pharma ⁶ .
Communicating with the other departments of hospital via e-mail.
Placing orders or receiving price proposals via e-mail.
Searching for suppliers.
Telephone
Communicating with suppliers.
Placing orders or receiving price proposals.
Communicating with other departments inside the hospital.
Fax
Communicating with suppliers.
Placing orders or receiving price proposals.

4.3. Pharmacy of Hospital C

Drugs used for inpatients are obtained from the hospital pharmacy and ward stocks. Drug procurement is made by the pharmacy. At the end of each year, the demand for drugs for the following year is forecasted by analyzing the past years' demands. After the forecast the needed drugs' are obtained after biddings are made by all the potential suppliers. At these supplier biddings corporate and commercial discount rates are noted with the consideration of yearly forecasted demand rates for the drugs. Suppliers ensure that they can provide them with the proposed discount rates, which are given in the previous bids to the pharmacy. Importantly, after the bids, suppliers are arranged according to their offers. Then, during the year bulk buying of weekly, monthly or quarterly schedules are made by communicating sequentially with suppliers according to prepared this list. For instance, three different suppliers, S1, S2, S3, had given average discount rates sequentially of 3%, 4% and 5% for the supply of XYZ drug at the bidding. Then, during the year when the pharmacy decides to make a bulk purchase of the drug XYZ, firstly they communicate with supplier S1 in terms of whether S1 can provide the order amount within the required time. If S1 replies positively, the order is given. Otherwise, communication is conducted with the other two suppliers in a sequential manner according to the offered discount rates.

⁶ A program which sources interactive drug information via internet.

Communication is conducted by fax, telephone or e-mail during the whole process of bidding at the end of the year, order placing and delivery of the goods during year. Additional orders other than bulk buying are made when there is excess demand. This process is presented in Figure 1.

5. General Drug Order Flow in A, B and C Hospitals

Generally, in all of the three hospitals the drug flow from doctor to the patient implementation is relatively the same. In Fig. 1 the drugs flow starting from the doctor's prescription to the patient's implementation is presented. From the perspective of procurement it is evident that the pharmacy has relations with wards, suppliers and financial departments. Wards are the treatment departments of the hospitals. The suppliers are drug firms and drug depots of these firms and sometimes pharmacies which work interdentally. The process of drug flow from doctor to patient can also be explained with these stages:

- ❖ Doctors place the order by preparing prescriptions. Then this order is taken by the nurses or the patient consultants.
- ❖ Stock which is held in the ward is controlled manually by looking at the stock lists⁷ whether the drug ordered is existent or not. From the internal computer system (ICS) the stock levels in the wards cannot be determined.
 - If the drug is in the ward stock:
 - The drug's specifications and price is entered to the system by nurses or patient consultants in the ward. Since the drug entry to the system is made by other employees rather than pharmacists, sometimes problems can occur.
 - The order given by a doctor is sent to the pharmacy by ICS or telephone. In the pharmacy, the order's dose, time, patient, and consumption purpose are all controlled. If there is any problem with the prescription, adjustments are made by communicating with the doctor over the telephone; if there are no problems:
 - ◆ The drug's entry, which has been taken from ICS, is approved by the pharmacy. Then, the ICS financial department makes the billing concerning the drug entry.
 - ◆ When the ward gets approval from ICS, the drug is prepared for implementation. In the preparation process, dose and implementation method is considered.
 - ◆ The prepared drug is implemented to the patient.
 - If the drug is not in ward stock:
 - The drug's specifications and price is entered to the system by nurses or patient consultants in the ward. Since the drug entry to the system is made by other employees rather than pharmacists, sometimes problems can occur.
 - The order is given to the pharmacy by telephone or ICS.
 - Received order's dose, time, patient, intake styles and controls are made by the pharmacy. If there are any problems in the prescription, adjustments are made by communicating with the doctor over telephone; if there is no problem:
 - ◆ Stock which is held in the pharmacy is controlled to see whether the drug ordered is existent or not. Stock control in the pharmacy is made on ICS.
 - If the drug is in the pharmacy stock:
 - The drug's entry which is taken from ICS is approved by the pharmacy. Additionally, the ICS financial department makes the billing for the drug entry.
 - The drug is prepared for implementation. In the preparation process, dose and implementation method is considered.
 - Prepared drugs are sent to the ward by manual handling or pipe system.
 - If the drug is not available in the ward stock:
 - Supplier searching is made by using telephone and e-catalogues prepared by suppliers for procuring the necessary drug. E-catalogues include the drugs' lists, specifications and prices. However, not all of the suppliers have e-catalogues.
 - When the right supplier is found, the order is placed over the telephone, fax or email.

⁷ Stock lists shows the stock levels for drugs in ward.

- The prepared order by the supplier is received and the procured drug’s billings are made by the pharmacy.
- The drug’s entry taken from ICS is approved by the pharmacy. Then, the ICS financial department makes the billing concerning the drug entry.
- The drug is prepared for implementation. In the preparation process, the dose and implementation method is considered.
- Prepared drugs are sent to the ward by manual handling or by the pipe system.

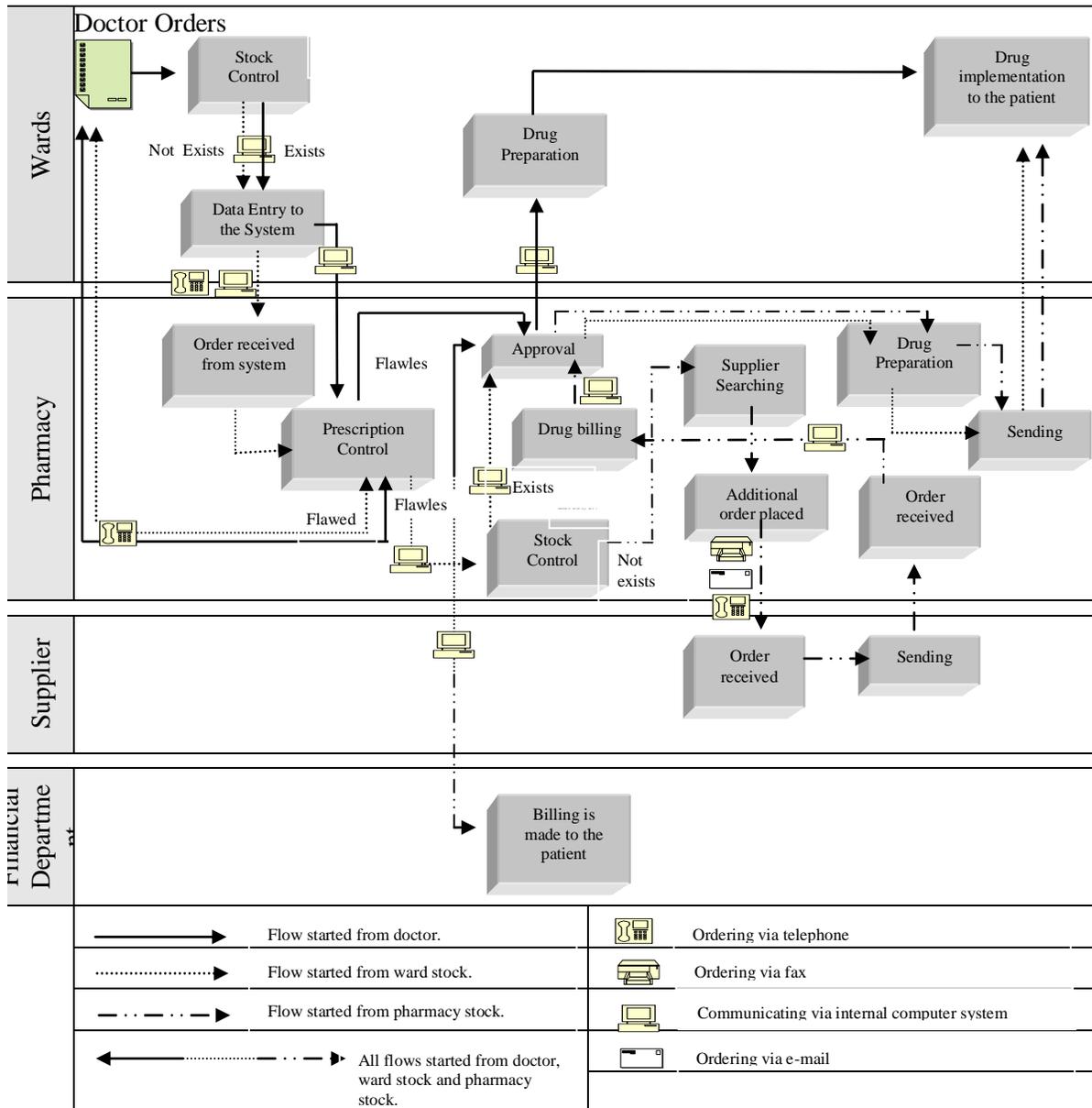


Figure 1: General Drug Order Flow

6. Comparisons and General Evaluation

It is observed that the pharmacy has a pivotal role in a hospital. It is like the gatekeeper between outside suppliers and hospital departments. The main role of the pharmacy is to provide the necessary drugs on time, managing drug stock in the pharmacy and the wards and consulting the necessary bodies in the hospital about drug interactions and usage purposes.

According to the findings and interviews with the managers of pharmacy departments, it is observed that all of the three pharmacies working under different hospitals use nearly the same techniques for the procurement of drugs. Furthermore, the technology they have used while performing the procurement activities are relatively the same. Figure 1 outlines this flow whereby all of the three pharmacies use the same technological tools for conducting the same operations. It could be said that the telephone is a very crucial tool for procurement activities, since pharmacies generally prefer using it for communicating and placing orders. The main reasons for the dominance of telephone among other technological tools are that it is easy to use, it does not require any effort to writing, and there is the opportunity to bargain simultaneously with suppliers. Besides, pharmacies also use the internet for varying intentions. It can be claimed that the internet is vital for pharmacies, since without connecting to GDDM, they cannot receive the quickly changing up-to-date information concerning drug prices and drugs which have been removed from the market. This means that if the information from GDDM is not followed regularly, huge financial losses can occur. For instance, a drug XY has been removed from the market; the web announcement is made via GDDM web site in the morning but the pharmacy has not yet controlled the web site.

Then by the afternoon a bulk purchase is made on drug XY on the same day and implementations to the patients are started. However, because of the web announcement from the GDDM web site, the drug which is implemented to patients is not covered by insurance. Therefore, it is obvious that it would give financial damage to the pharmacy and the hospital. Compared to the internet and telephone, faxes are less critical for pharmacies. As mentioned above, communication with suppliers is conducted via telephone and only sometimes order placements are made via fax.

When procurement techniques are compared between the aforementioned hospitals, it is observed that additional procurements are made using the same methods, although general (bulk) buying styles are slightly different. Since hospital B has other branches, it prefers bulk buying for all its hospitals in order to reduce costs by buying on a large scale. This means general procurement is made from a center, not from a single pharmacy. However, the same technological tools, telephone, fax and e-mail are used for procurements. Pharmacy A's and Pharmacy C's general procurement styles resemble each others. The only difference is that in pharmacy C preparations are made in advance for the following year's drug order amounts with bidding conducted at the end of the year.

In this study, it is assumed that procurement starts with an order coming from a doctor. The internal flow of this order from the doctor to the implementation of the drug to the patient is analyzed in all three hospitals. It is observed that in all three hospitals the same route and the same departments take part in this process.

From the e-procurement perspective, it can be claimed that more technological tools can be used for procurement activities in the pharmacies, and also the drug flow from doctor to the patient can be improved. These ideas will be explained and evaluated below:

- E-mail usage can be increased in placing orders and receiving replies. With the help of e-mails rather than making the same telephone call to more than one supplier, a written text can be prepared concerning the drug order and e-mailed to all suppliers at the same time. Then, according to the replies from suppliers, the decision of which supplier and procurement can be determined. However, pharmacies claim that bargaining simultaneously is more effective than e-mails although discussions are not at the same time. So, firstly e-mails to the number of potential suppliers can be decreased, then telephone calls can be made to those who have passed the first stage. Additionally, the proposed strategy for additional procurement is considered to be useless. At times, emotional pressure is placed on the suppliers and pharmacies, and within minutes the orders and replies can be transferred between these two groups. Rather than making telephone calls to all suppliers, firstly e-mails can be sent, then calls can be made to the suppliers which are likely to be selected. This would be less time consuming. This process is presented in figure 2 in the blue circled areas.
- In Figure 2, the drug flows from doctor to patient and additional procurement activities are presented. However, it is observed that by making small adjustments the drug flow can be expedited, simplified and potential errors can be eliminated. As is presented in Figure 2, in the red circled areas, by keeping a pharmacist in the wards (pharmacists in pharmacy can be allocated to the wards) and electronic ordering the process can be improved positively. Currently, in hospitals doctor orders drugs via a prescription and these orders are entered into the system by nurses or patient consultants. Besides, there are no pharmacists present in the wards so prescription controls and approvals are made in pharmacies. Additionally, the prescription control is made between the pharmacists working in the pharmacy and the doctors.

If hospitals allocate its pharmacists to the wards or hire other pharmacists and obtain the technology necessary for electronic ordering via pocket computers, the process can be enhanced. In the proposed system, the doctor and the pharmacist prepare drug lists for the patient together. With the help of this system, prescription controls regarding drug interactions, dose, suitability to the patient, depending on their illness, can be made simultaneously with drug orders. Besides, orders can be given electronically with the use of pocket computers which are integrated with ICS. That means the “Data Entry to the System” step can be eliminated and potential problems because of semiskilled personnel (nurses and patient consultants) can be eliminated. Moreover, approval operations made by the pharmacy can be undertaken by the pharmacists working in the wards.

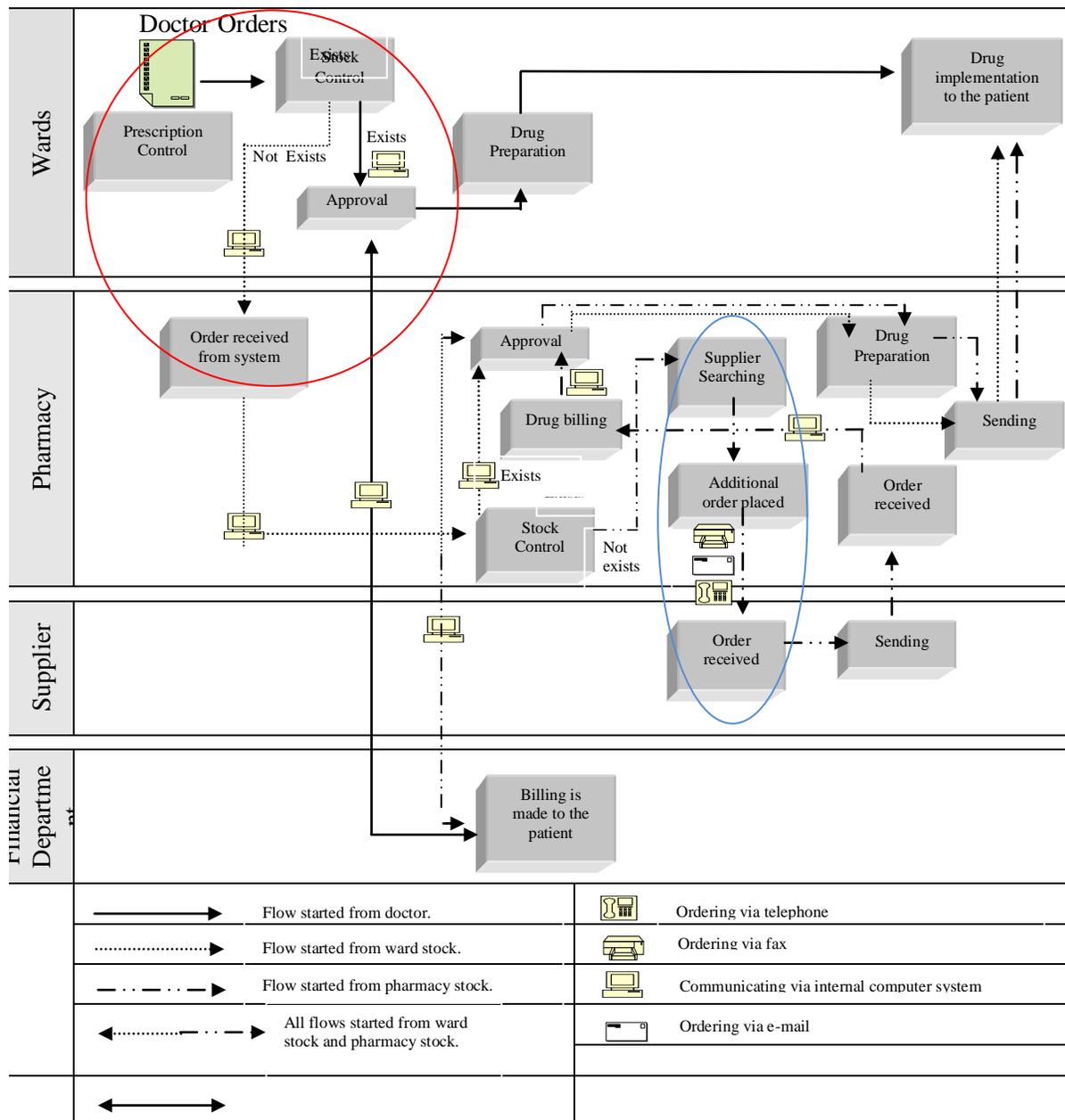


Figure 2: Adjusted General Drug Order Flow

7. Conclusion

E-procurement can be used by many organizations operating in both the public and private sectors. Thanks to this, several performance improvements which are briefly stated in this study can be achieved through procurement activities.

Although there are some barriers to adopting e-procurement in organizations, its usage can be expanded in small stages since the escalating competition among companies requires the use of technology as much as possible in almost all operations. Therefore, in order not to fall behind in the fierce competition, technological improvements should be followed by companies. In this respect, e-procurement can be a vital weapon. However, literature concerning e-procurement suggests that in a number of sectors in developed countries, the adoption of e-procurement in procurement activities is in its starting period. From this point, the motivation of this study has come into existence. Namely, the situation of technological equipment usage in operations related with e-procurement, its adoption and potential ways for improving general performance are questioned by the three pharmacies operating under the management of private hospitals in Ankara, Turkey. So, in this study for presenting the general technological situation in pharmacies of private hospitals, the interviews and observations were made with the managers of the three pharmacies. It was observed that, like in many countries, there can be improvements in procurement activities and other operations related with procurement with the use of technology in private hospitals. Also in this study, some suggestions have been proposed to improve performance in procurement and operations which are closely linked to procurement activities.

These suggestions include advantages of e-mail usage, keeping a pharmacist in wards of the hospital and electronic ordering. With these changes, which do not require huge investments, serious beneficial results can be obtained in these hospitals. The number of pharmacies observed can be seen as lacking for this kind of study; however, by concentrating on three pharmacies, it is believed that the general framework for e-procurement usage in this sector is presented in a detailed manner. In future studies, the same hospitals' situations can be observed to conduct a longitudinal study or the number of the pharmacies can be increased in order to make valid generalizations from the obtained results.

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