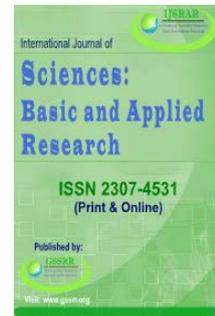




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E-Procurement for Creating Competitive Advantage in the National Health Service Finance

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Abstract

The aim of this research was to identify the key operations management issues facing the introduction of e-procurement system in the finance department of a Hospital in the UK. In 2013, the UK Health Secretary of State published "Better Procurement Better Value Better Care", which initiated a new efficiency scheme which would stabilise the spending budget of Hospitals in the UK with a view of spending no more than they would currently do by the end of 2015/16. The scheme should save the NHS in excess of £1.5bn a year on a recurrent basis. One of the key strategy has been the introduction of global GS1 coding and PEPPOL messaging standards through the supply chain. Compliance with GS1 and PEPPOL would enhance master data list, automatic exchange of procurement data and allow quick benchmarking of prices which in turn encourages a healthy competition in the eco system. These strategies are already in use in the commercial sector of manufacturing, banking and retail sector. The health sector has been slow in adopting e procurement strategies and in some cases non-existence.

Keywords: E Procurement; Competitive advantage; Finance Department; National Health Services; UK; Funding.

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1. Introduction

Although commercial organisations are increasingly doing e-business using information and communication technologies and the internet, the National Health Service (NHS) is very new to this. The e-procurement is purchasing implemented through the Internet. It has an important role in achieving efficiency and effectiveness in business today. This results in a reduction in the intermediate costs and labour that are associated with conventional systems.

The e-procurement initiatives involve many issues such as security, the products to be procured and also the initial investment needed. Despite the various complications, the NHS central government is giving incentives to various hospitals and councils to join the trend owing to the enormous cost savings e-procurement can bring in.

One of the major issues concerning e-procurement initiatives is security. Companies usually are reluctant from sending sensitive information over the Internet for security reasons. The growing number of cybercrimes has added doubts regarding the reliability of the Internet. Security measures such as authentication and encryption are therefore widely used while passing sensitive information between companies.

Second issue concerning e-procurement is the type of goods that are procured through the online medium. Companies usually prefer to source smaller and inexpensive goods such as office stationery. Larger complex orders that usually take weeks or months for negotiation are still done in the traditional manner. The NHS has around three hundred thousand product portfolio in use ranging from £0.02 to £2m for some expensive kits. However the rapid improvement in software technologies has encouraged some companies to employ e-procurement for expensive items too [14].

The introduction of e-procurement initiative is normally to improve the overall performance of its business. Although the initial investment required in hardware and software is usually high, the return is expected to be high. Some companies can enjoy a return as much as 400% of the initial investment in three years. However this may not be the case given the cost involved to set such system and the benefit may not realise.

Other issues e-procurement has a direct impact are internal processes and standardisation, reluctance in commitment to share data with trading partners, workers apprehensions and training, marketplace not ready to take on B2B services and inequities in power between trading partners.

So in summary the operation issues are:

- Security
- Type of goods
- Saving releasing initiatives

- Internal processes
- Staff Training and participation
- Confidence on suppliers partners
- Market place

Each of the above issues would be investigated at the study site. The study site is a Teaching Hospital which is situated in London.

2. Literature Review

Electronic procurement systems represents an important development for the purchasing process which offers benefits to the organisation through efficiency gain, enhanced collaborative relationships with suppliers and price reductions [1]. Tan [2] identified potential for improvements in supply chain management arising from adoption of e-business systems in five main areas, these are:-

- Cost efficiency benefits
- The impact of e-procurement systems on the form and nature of supplier governance
- System implementation
- Information technology infrastructure issues and
- Organisation and relation issues

However procurement usually represents one of the largest expense items in a company that can neutralise some of the benefits of e-procurement [3]. Huber [4] conducted a study to look at the operational issues faces by firms in launching e-procurement and the following barriers were found which significantly suppressed the benefits of e-procurement. These were:-

- Concerns on security and confidentiality of the data needed to be exchanged in electronic environment.
- Reluctance to share data with trading partners.
- Non feasibility of custom made products.
- Lack of standardisation.
- Uncertainty over trust and commitment among trading partners.

Day [5] noted user's reluctance to be subjected to significant changes in business processes as a major barrier to the implementation of e-procurement system. Saeed [6] examined buyer's perceptions of e-procurement risks and found three issues:-

- Transaction risks resulting from wrong products purchased due to incomplete or misleading information.
- Security risks resulting from unauthorised penetration of trading platforms and failure to protect transaction related data while being transmitted or stores and

- Privacy risks from inappropriate information collection and information transparency.

The study also revealed prohibitive and discouraging aspects of e-procurement such as costs and development time and lack of trust between buyers and sellers [11]. Managers on the other hand showed resistance to change since they were uncertain over the ability to gain the expected return on investment and the work itself required to enforce business process changes. This is further amplified by worker apprehensions about being replaced by automated procurement systems [12].

Helen [7] uncovered a number of issues affecting e-procurement which appeared to be difficulties facing business to business commerce. These were:-

- Market not ready for e-procurement
- Inequities in power between trading partners
- No single point of contact.
- Cross enterprise systems integration issues.
- Lack of trust among trading partners and therefore reluctance to share data and information and
- Issues of capital especially for small firms and the scale of transaction not there to benefit from economic of scale.

Thomas [10] pointed out that one area which is still not resolved is the legality and force of e-mail contracts, role of electronic signatures and application of copyright laws to electronic documents. And finally Helen [7] revealed the technical difficulties related to information and data exchange and conversion such as inefficiencies in locating information over the internet using search engines and lack of common standardisation that restrict integration of electronic catalogues from different suppliers. Zhu [8,9] found that the major concerns among companies was how participation in e-procurement environment threatened their profits making ability through data exposure, pricing pressure from customers and the resulting loss in margin [13,15].

3. Objective

The objectives of this paper were to conduct a mini survey in the finance department of a NHS Trust. The main objective was to look at the main operational issues encountered with the recent introduction of the e-procurement system. In particular the following parameters were collated and visited for further analysis:

- Process
- Staff training and staff involvement
- Security
- Cost
- Information Technology
- Type of goods
- Organisation and relationship issues

4. Methodology

In order to conduct the survey, meetings were set with the Operation Manager and the Head of Procurement. A series of questions were selected which were then discussed at the meeting. A questionnaire used in this survey is attached in the appendix 1. Although the managers agreed to participate in this survey, they opted to stay anonymous in this report and hence all reference to the Trust in question was referred to as “Study Site” or Trust in this report. Due to the short time-scale of the study, some information was collated by observing the day to day running of the section whilst a good proportion of information was gathered by face to face interviews. Some information like finance, system information and manuals were readily available from the procurement department. A fair bit of information was also made accessible via the Trust intranet. Tools like process map and charts were also used to analyse the operation in detailed.

5. Finding and Analysis

The data and interview feedback was presented in form of process flow, tables, graphs and brief explanation.

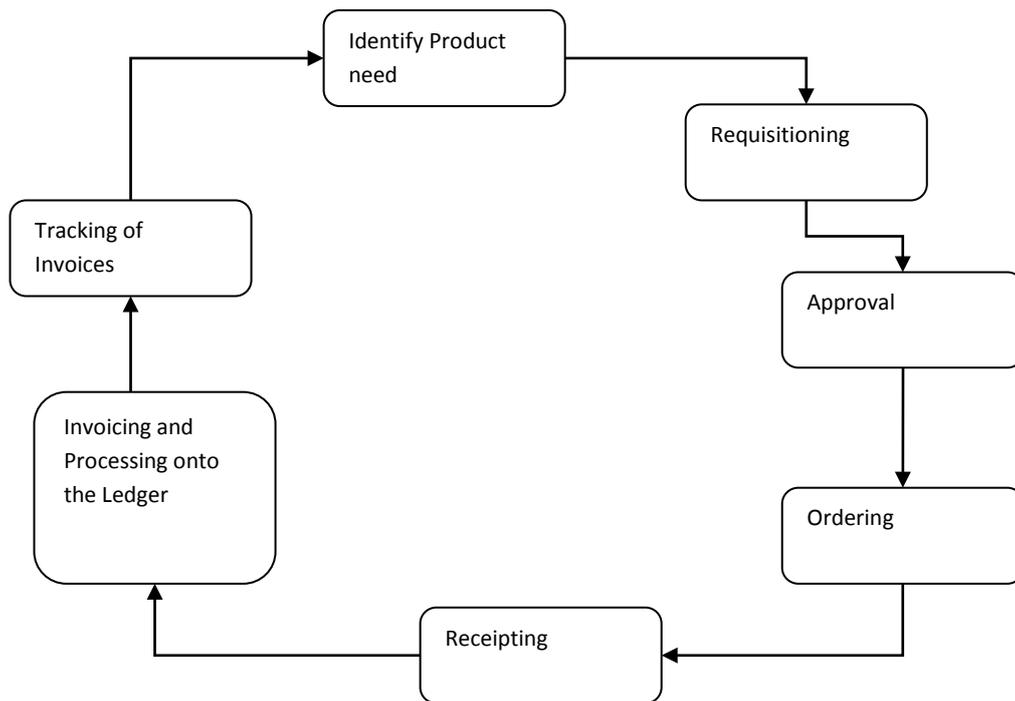


Figure 1: Current Process Flow

5.1 Process Map before implementation of e-procurement

Before the implementation of the e-procurement module, the processes involved from identifying the goods needed to final payment of the items could range from one week to 18 weeks on average.

5.2 *Process flow shows how invoices passes through the organisation before final payments are made before the introduction of e-procurement. Six departments are involved in the acquisition of goods and services and they are not located closely.*

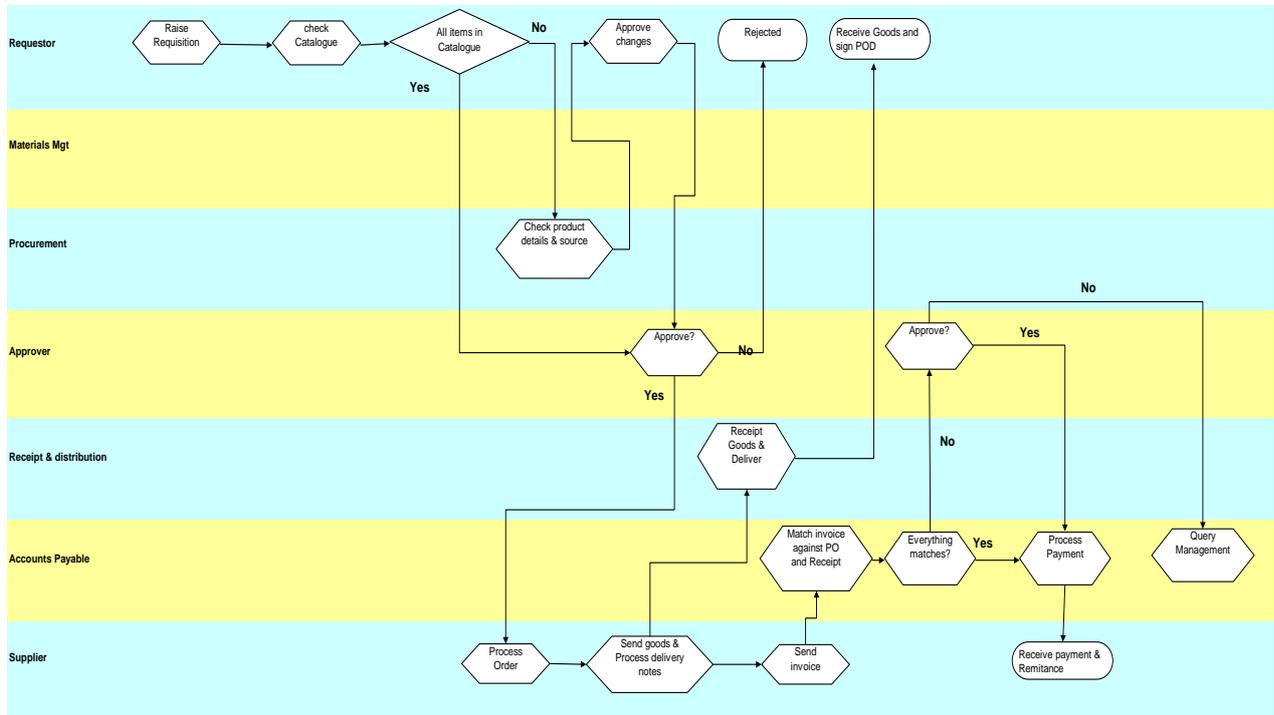


Figure 2: Process Flow before e procurement

5.3 *With the introduction of e-procurement, one more department was established and all new processes/activities were highlighted in green in the flow chart below.*

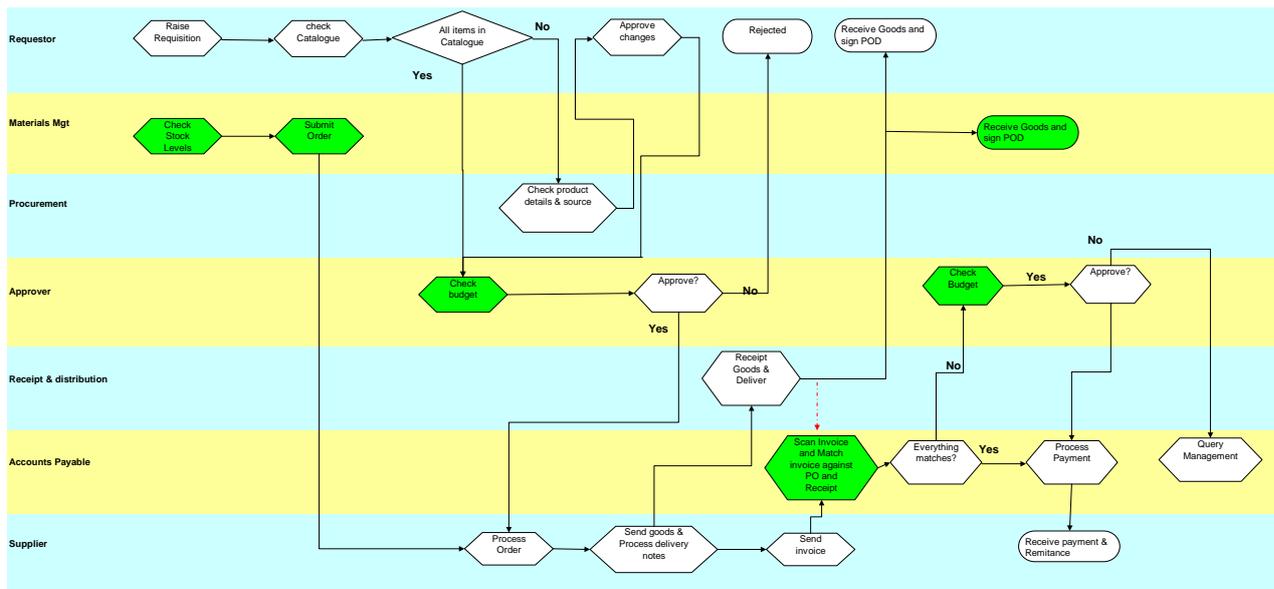


Figure 3: Process Flow after e procurement

5.4 Process Flowchart before and after the implementation of e-procurement with cost (table 1).

Table 1: Process Flow costing before and after e procurement

Pre e-procurement									Average	Average	Processing
Step	Requestor	Materials Mgt	Procurement	Approver	Receipt & distribution	Accounts Payable	Supplier	Description of process	Time (min)	Distance (meters)	Cost
1	Requestor							Manager identifies the need of a product and raise a requisition	30	60	7.20
2	Requestor							Check the catalogue for the item	35	10	8.40
3		Materials Mgt						Items on in Catalogues are referred to procurment to investigate	150	100	36.00
4			Procurement					Order approved	200		48.00
5				Approver				Place order	120	60	28.80
6							Supplier	Goods sent and process delivery notes	60	100	14.40
7					Receipt & distribution			Receipt Goods and Deliver	180	100	43.20
8	Requestor							Receive goods and sign Purchase Order Delivery	15		3.60
9							Supplier	Receive Invoice	160	100	38.40
10						Accounts Payable		Match invoice against Purchase Order	35		8.40
11				Approver				Approve transaction	20		4.80
12							Supplier	Process Payment	25		6.00
13	Requestor							Query to Management	180	100	43.20
									1,210	630	290.40

Post e-procurement									Average	Average	Processing
Step	Requestor	Materials Mgt	Procurement	Approver	Receipt & distribution	Accounts Payable	Supplier	Description of process	Time (min)	Distance (meters)	Cost
1	Requestor							Manager identifies the need of a product and raise a requisition	15	5	3.60
2	Requestor							Check the catalogue for the item	15		3.60
3		Materials Mgt						Items on in Catalogues are referred to procurment to investigate	20	100	4.80
4		Materials Mgt						Check Stock level weekly	10		2.40
5		Materials Mgt						Submit order	10		2.40
6			Procurement					Check Budget	5		1.20
7				Approver				Order approved	30		7.20
8							Supplier	Place order	60	5	14.40
9							Supplier	Goods sent and process delivery notes	60	100	14.40
10					Receipt & distribution			Receipt Goods and Deliver	180	100	43.20
11	Requestor							Receive goods and sign Purchase Order Delivery	15		3.60
12							Supplier	Receive Invoice	30	5	7.20
13						Accounts Payable		Scan Invoices or E-Invoice	5	5	1.20
14								Match invoice against Purchase Order	15	5	3.60
15		Materials Mgt						Match invoice against Purchase Order	15	5	3.60
16				Approver				Check budget	5		1.20
17				Approver				Approve transaction	5		1.20
18							Supplier	Process Payment	10		2.40
19	Requestor							Query to Management	60	5	14.40
									565	335	135.60

5.5 Staff training and staff involvement.

Pre e-procurement, all requisitioning and ordering were done on a paper base and documents had to transit through various departments before an order could be placed. This process on some occasions could take few days. For urgent supplies, the order is place directly to the supplier by the managers bypassing procurement. The paper work is then done afterward. The Auditors previously raised concerns regarding this method of acquiring goods and services. Currently any budget holder is allowed to place an order bypassing the procurement as far as the goods and services are less that £5,000.

For items that are higher than £5,000 different set of rules are applied and the e-procurement system will not approve an order until the different stakeholders have gone through and authorised the acquisition. For instance an order of £20,000 will have to be authorised by at least three managers with different authorisation/financial limits. In fact goods higher than £10,000 are subject to tendering process. This new rule has to be albeit all the time. The table 2 and 3 below show the different staff involvement at different levels in the authorisation process and tendering.

Table 2: Authorization limit rules

Value (Ex. VAT)	Quotation or Tender	Issued by	Received and Opened by	Contract Authorisation	Order Signing Authority	Waiver Authorised by
Under £10,000	Obtain via contract source wherever possible if not single verbal or written quotation (more if felt appropriate)	Estates /Ordering Officer or Procurement Department	Estates /Ordering Officer or Procurement Department	Budget holder Purchasing Manager Estates Manager Director of Facilities	Senior Buyer	Not Applicable
£10,000 - £30,000	3 written quotations *	Estates /Ordering Officer or Procurement Department	Facilities Business Manager/Ordering Officer or Procurement Department	Budget holder <u>and</u> Purchasing Manager Director of Facilities for Works	Purchasing Manager or Director of Facilities for Works	General Manager <u>and</u> Assoc. Director of Procurement or Director of Facilities <u>and</u> Assoc. Director of Procurement for Works
£30,001 - £90,319	Minimum of three written tenders	Estates Officer/Contract Administrator for Facilities or Procurement Department	Chief Executive or nominated representative plus 2 others not from Ordering Department	Purchasing Manager <u>and</u> Assoc. Director of Procurement Director of Finance Director of Facilities for Works	Assoc. Director of Procurement or Director of Facilities for Works	Assoc. Director of Procurement <u>and</u> Director of Finance or Director of Facilities <u>and</u> Director of Finance for Works
Over £90,319	European Union tender rules apply except for Works where minimum of 4 tenders required for up to £500,409 and 5 tenders up to £999,999	Estates Officer/Contract Administrator for Facilities or Procurement Department	Chief Executive or nominated representative plus 2 others not from Ordering Department	Assoc. Director of Procurement <u>and</u> Director of Finance or Director of Facilities <u>and</u> Director of Finance for Works	Assoc. Director of Procurement or Director of Facilities for Works	Chief Executive <u>and</u> Director of Finance with report to Trust Board

Over £1,000,000	European Union tender rules apply except for Works where minimum of 6 tenders required	Estates Officer/Contract Administrator for Facilities or Procurement Department	Chief Executive or nominated representative plus Trust Board member and 1 other neither of whom are to be from Ordering Department	Trust Board or Chief Executive for Works	Director of Finance or Director of Facilities for Works	Trust Board to give formal approval
Over £3,497,313	European Union tender rules apply	Prepared by Facilities Directorate in conjunction with Procurement Department	Chief Executive or nominated representative plus Trust Board member and 1 other neither of whom are to be from Ordering Department	Trust Board	Director of Finance or Director of Facilities for Works	Trust Board to give formal approval

Table 3: Authorization process rules

No.	Authorization process rules
1.	When determining a value of any potential purchase, lease or contract, care must be taken to include the full costs incurred over the lifetime of the purchase, or for consumable items, that the full year is used as the indicative value
2.	All tenders to be addressed to the Chief Executives and returned to the Legal Service Dept.
3.	Any persons involved in the opening or approving of tenders or quotations shall declare any interest that he/she has in any firm or company involved in tendering or quoting for the work or services concerned and withdraw from the process.
4.	*Quotations obtained by ordering department must be registered with Procurement before orders are raised.
5.	Quotations received by Facilities Business Manager (FBM) to be opened by the FBM in the presence of one other non-technical officer in the Facilities Directorate. All quotations logged sequentially in the Quotation Book and copy of competed Invitation to Quote Form to be sent to the Procurement Department for registration.
6.	All Waivers to be lodged with the Procurement Dept.
7.	For appointments of professional consultants above the sum of £93,738 European Union tender rules apply.
8.	Contract authorisation must precede order signing.

5.6 Security perception

Forty six staffs were interviewed and 74% thought the e-procurement was a secure system and that they were confident to use it effectively. 95 % of staffs said that the paper based system was more reliable and secure as

compared to the e-procurement.

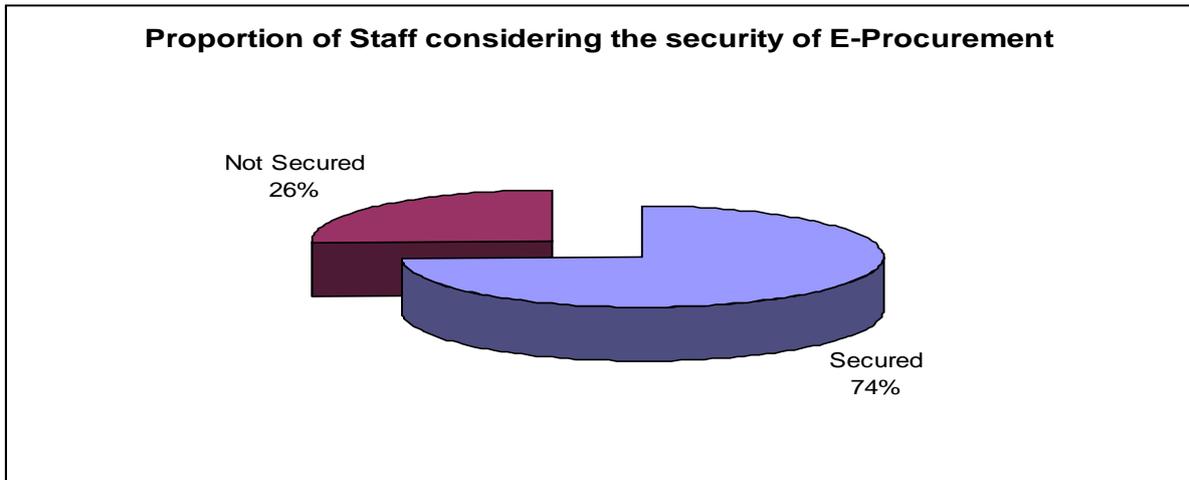


Figure 4: Staff perception of Security

5.7 Security perception by grade of staffs

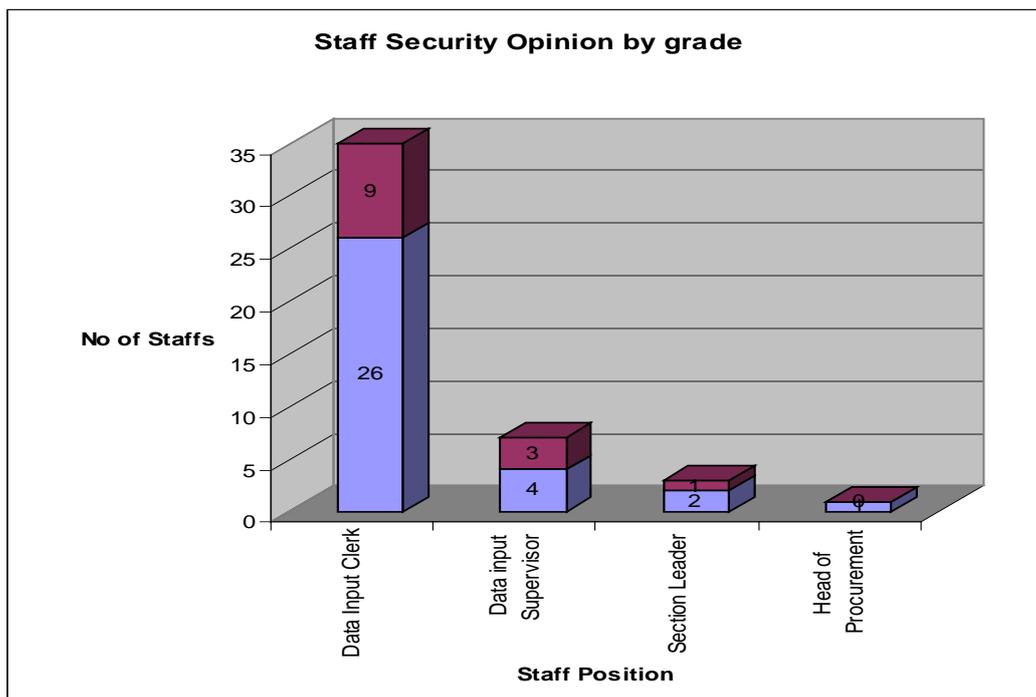


Figure 5: Grade of Staff perception of Security

5.8 Cost implication pre and post e-procurement.

Information regarding the cost of the software was not made available and hence only the pay establishment was investigated instead.

Table 4: Establishment cost

Department	Staff Grade	Pre-Eprocurement			Post-E procurement		
		WTE	Cost	Total cost	WTE	Cost	Total cost
Material Management	Band 2	0.00	£16,000	£0	3.00	£16,000	£48,000
	Band 3	0.00	£17,000	£0	4.00	£17,000	£68,000
	Band 4	0.00	£21,000	£0	1.00	£21,000	£21,000
Procurement	Band 2	10.00	£16,000	£160,000	10.00	£16,000	£160,000
	Band 3	8.00	£17,000	£136,000	8.00	£17,000	£136,000
	Band 4	5.00	£21,000	£105,000	5.00	£21,000	£105,000
	Band 5	5.00	£28,000	£130,000	5.00	£28,000	£130,000
	Band 6	3.00	£32,000	£96,000	3.00	£32,000	£96,000
	Band 7	2.00	£38,000	£76,000	2.00	£38,000	£76,000
	Band 8a	1.00	£45,000	£45,000	1.00	£45,000	£45,000
	Band 9	1.00	£93,000	£93,000	1.00	£93,000	£93,000
	Approver	Band 4	0.00	£21,000	£0	3.00	£21,000
Receipt and Distribution	Band 5	0.00	£26,000	£0	3.00	£26,000	£78,000
	Band 2	15.00	£16,000	£240,000	15.00	£16,000	£240,000
	Band 3	14.00	£17,000	£238,000	14.00	£17,000	£238,000
	Band 4	9.00	£21,000	£189,000	9.00	£21,000	£189,000
	Band 5	8.00	£26,000	£208,000	8.00	£26,000	£208,000
Account Payable	Band 2	4.00	£16,000	£64,000	12.00	£16,000	£192,000
	Band 3	8.00	£17,000	£136,000	15.00	£17,000	£255,000
	Band 4	15.00	£21,000	£315,000	15.00	£21,000	£315,000
	Band 5	10.00	£28,000	£280,000	10.00	£28,000	£280,000
	Band 6	8.00	£32,000	£256,000	8.00	£32,000	£256,000
	Band 7	5.00	£38,000	£190,000	5.00	£38,000	£190,000
	Band 8a	3.00	£45,000	£135,000	3.00	£45,000	£135,000
	Band 8b	3.00	£53,000	£159,000	3.00	£53,000	£159,000
	Band 8c	1.00	£64,000	£64,000	1.00	£64,000	£64,000
		138.00	£781,000	£3,295,000	167.00	£781,000	£3,820,000

The pay cost increased by £525k for the year as a result of increase establishment of 29 wte (Whole time Equivalent). Out of the 29 new wte, 14 new posts were permanent whilst the remaining posts were only temporary as transitional positions to help with the back log of work. The back log of work was as a result of implementation of e-procurement.

5.9 Information Technology.

The study site has an IT infrastructure which was compatible with the e-business module with very minimal changes. In total three additional servers were required whilst most of the end users PC were upgraded. The total cost of upgrading the PC was in the region of £430k across the Trust. This excluded the e-procurement software itself.

A significant change in practice though was the scanning of all invoices before further processing. Previously invoices received from suppliers were first date stamped in Finance, then sent to respective cost centre managers to approve and authorise. The turnaround time for this was around 4 weeks and sometime invoices get missing in transit. Now since all invoices are scanned, they can be forwarded electronically to managers for approval. Invoices can now be tracked down where they are in the system.

There are five contrasting exchange types employed within the e-procurement transactions.

- Internet: The buyers have the opportunity to identify potential suppliers via the web. On-line search and comparison of list prices are typically used for specialist or low value purchases. Depending on the nature

of the supplier's web site facilities, orders may be placed on-line, via e-mail or by telephone and fax.

- Exchange: This is a business to business auction service which allows buyers and sellers to bid for contracts. This can reduce cost significantly but it is not well developed at present.
- Marketplace: This is a multi-supplier catalogue maintained by a third party. The Trust pays an annual fee to subscribe and it is accessed via the internet.
- Trust Hub: This is the buyer solution which is very similar to a market place except it is maintained by the buyer as compared to a third party.
- Extranet: This is a secure, security protected internet link to the supplier. Information is frequently shared and most invoices with these companies are downloaded into the trust system before processing.

5.10 Type of Goods.

The Trust used goods and services from a variety of suppliers and there are around 20,000 suppliers and the non-pay expenditure is in excess of £250m a year. The table below shows some of the most frequently used items. These items are subjective i.e. each subject can be further expanded into individual items.

Table 5: Non Pay cost

Expense Category	No of supplier	Average Quantity	Annual Cost	% Annual cost	Cummulative % Annual cost	% Quantity	Cummulative % Quantity
MSSE Purchases	6,000	32,200,000	£80,500,000	39.69%	39.69%	81.38%	81.38%
Disposable Bedding and Linen	45	3,750,000	£7,500,000	3.70%	43.39%	9.48%	90.85%
Drugs	2,500	1,160,000	£58,000,000	28.60%	71.99%	2.93%	93.79%
Dressings	453	833,333	£5,000,000	2.47%	74.46%	2.11%	95.89%
Laundry Costs	20	800,000	£4,000,000	1.97%	76.43%	2.02%	97.91%
Laboratory Equipment Instruments and reagents	2,000	575,000	£23,000,000	11.34%	87.77%	1.45%	99.37%
Patients appliances	3,500	120,000	£15,000,000	7.40%	95.17%	0.30%	99.67%
Printing & Stationery	500	80,000	£800,000	0.39%	95.56%	0.20%	99.87%
Building maintenance-equipment & materia	76	13,333	£2,000,000	0.99%	96.55%	0.03%	99.91%
Computer Hardware and Software purchase	12	10,000	£5,000,000	2.47%	99.01%	0.03%	99.93%
Hardware & crockery	54	8,000	£200,000	0.10%	99.11%	0.02%	99.95%
Staff Clothing	120	8,000	£200,000	0.10%	99.21%	0.02%	99.97%
Medical gases	3	5,556	£500,000	0.25%	99.46%	0.01%	99.99%
Office Equipment	576	2,500	£500,000	0.25%	99.70%	0.01%	99.99%
Advertising Costs	25	2,000	£200,000	0.10%	99.80%	0.01%	100.00%
Furniture Furnishings and Fittings	654	1,333	£400,000	0.20%	100.00%	0.00%	100.00%

Total 16,538 39,569,056 £202,800,000

A Pareto analysis was also done as above and it is found that MSSE (Medical Supplies), Consumable & Disposable and Drugs accounted for nearly 72% of the expenditure. MSSE were supplied by 6,000 suppliers whilst Drugs were supplied by 2,500 suppliers. Consumables and disposable were supplied by just a handful of suppliers and the vast majority of them were indeed supplied by NHS Logistics. The Trust has an intranet connection with NHS Logistics which bulk buys items for Trusts across the country. Orders are placed directly via the intranet and goods are normally delivered within 24hrs i.e. daily deliveries.

MSSE and Drugs had the most expenditure and also had a wide spectrum of suppliers. However on closer inspection, most of the drugs were supplied by seven main companies which the Trust has recently established

EDI system with. Invoices are sent electronically to the Trust as PDF files and can also be downloaded into other systems i.e. Excel and access for further analysis. This has reduced the data input activities and allows payment to be made quickly. The Trust has also been able to negotiate a discount on bulk buy and swift payment which further reduced cost. The Pharmacy department of the Trust has its own stock system which produces stock level every day and sends out stock requests to those listed companies electronically on a daily basis to maintain drug level constant. Any special drug requirements are however placed individually with specialist suppliers.

Most equipment and patient appliances acquisition are done via a tendering process whereby at least three competitive quotes have to be considered as a minimum to make a purchase. Details of all invitation of tenders are readily available in the e-procurement module and the Trust web site. There is also e-auction for computer supplies which has recently been introduced.

5.11 Organisation and relationship issues.

The survey revealed that e-procurement had an impact on both internal and external relational linkages. Motivating the buyers was key to the use of e-procurement. The increase use of information technology between buyer and supplier did improve level of trust between buyers and sellers although close buyer-supplier relationships had a strong positive impact on the adoption of e-procurement. In fact the team of buyers are divided into sections and each section deals with specific suppliers all the time. Although not all suppliers are part of the e-procurement system, the intension is to include as much as possible. The current problem lies with suppliers having different IT systems which are stopping integration and also not all suppliers are willing to give access to their system due to security reasons. Security risks are mainly unauthorised penetration of trading platforms and failure to protect transactions related data while being transmitted or sorted. Some suppliers fears that their privacy will be compromised due to inappropriate information collection and information transparency. Whilst a handful of suppliers declined adopting the e-procurement route due to transaction risk which from wrong products been purchased due to incomplete or misleading information.

6. Discussion

6.1 Strategic fit between the Organisation's current portfolio processes and systems.

6.1.1 Price Efficiency:

By reducing the variety of alternatives available for users to select, the opportunity to negotiate discounted prices was possible. In fact expenditure on drugs has seen a 5% reduction in total cost. The e-catalogue database has centralised all suppliers into one system and the improved management information had enabled consolidation of supply to fewer providers and increased user awareness of the 'approved' suppliers for each purchased items. It is anticipated suppliers will give competitive prices to be on the approved suppliers list. For high cost items over £50k, the Trust has to comply with rules and regulations. The e-procurement adoption had significantly improved compliance due to the ease of access for users to contracted suppliers. Again compliance means the items have to be tendered and hence contract is subject to competitive pricing. It is anticipated that e-

procurement systems from different Trusts across the country can be liked in the future which will allow benchmarking of prices paid within the NHS and other bodies.

6.1.2 Internal Cost efficiencies:

Although savings in terms of purchases are relatively easy to identify through invoice and budget data, the Trust reported significant difficulties in clearly identifying process savings. The staffing cost increased by nearly £500k although most of these were on temporary posts. The cost per order under e-procurement is estimated to be around £45 as compared to £68 pre implementation. These cost estimates was considered to be applicable only to a narrow range of standard, high volume, single supplier purchases. With time once the system is fully integrated across the trust then process efficiencies will most likely come from accurate swift processing of invoices. Most of the efficiency savings will come from MSSE and drug budget since suppliers of these products have integrated electronic data exchange system linked with the Trust.

6.1.3 Procurement

Efficient procurement will ensure that goods are ordered, handled and paid for in the most efficient way possible. The e-procurement not only provides part of an integrated financial system but also provides management information on activity and expenditure. This enables informed decisions to be made on how to make processes more efficient, which will then in turn make e-procurement more effective in delivering its prime objectives. The key actions to improve e-procurement efficiency and effectiveness are as follow:-

- Reduce the cost of ordering and number of low value orders by rationalising the supplier base
- Aggregation of orders across the Trust where possible and practical taking into account e-commerce.
- Consolidation of deliveries including use of “cross docking” (products brought in from other warehouses to the main distribution point) to reduce delivery charges.
- Improve dialogue with major suppliers on how to reduce the total cost of supply. Effective management of key suppliers with an emphasis on ensuring that contract deliverables are monitored and reported on and that appropriate action taken in the event of poor and unacceptable performance.
- Develop a system of “delegated ordering” where user departments order direct against specific contract items with suppliers allowing Procurement Department to concentrate on added value activities.
- Promote access for local businesses to opportunities for supplying goods and services to the Trust.

In the short term the type of goods and services where the above are valid will be for medical supplies and drugs. Once the system is up and running then other expenses such as Dressing and Laundering should be considered.

6.1.4 Stock

Most departments held stocks of regular consumables items. Although holding stock is seen as undesirable because of the value tied up in it and the cost of maintaining it, there is a need to have the right materials at point of use when required. This will inevitably lead to some stock being held within the Trust along the supply chain.

The volume and value will be dependent upon the operational risk of being without stock and the length and time period of the supply chain. The following key areas should be considered to minimise stockholding, activity and risk.

- All stock commodities should be reviewed as the first stage of a supply chain review. This review will consider all the relevant costs of the current supply chain; explore options such as the extended use of NHS Supply Chain and implement change where there are benefits across the whole Trust.
- Continue to roll out Materials Management for major departments to include all products currently classed as stock or non-stock.
- Ward Materials Clerks working within the Procurement Department should be employed in order to release front line care resources through the reduction in activities and time spent on supply related issues
- Implement desktop on-line ordering for all stock items for areas not suitable for automatic data capture.

6.1.5 Usage

The overall expenditure on goods and services was heavily influenced by the amount of consumables used and the way equipment is utilised. Examining the patterns of usage across the Trust will normally led to variations in usage rates across wards with similar occupied bed days. There are opportunities to reduce costs through examining variations, minimising freedom of choice and reducing levels to those of the lowest user. Few strategies will be to analyse variation of usage across departments with similar activities and identify a significant variation if possible. This can be done by identification of a shopping basket of common items and compare usage across wards. This should identify products where wastage is a problem and further investigation required. The e-procurement should allow the Trust to work with other Trusts to benchmark usage patterns and adopt best practice.

6.1.6 Information Technology.

The need to develop E –Commerce within government departments is recognised as a major initiative, which is fully supported in this Trust. The term E-Commerce has no singular meaning but is generally concerned with using IT for the tendering, ordering and payment of goods. The focus within this Trust has been initially to be on using IT to improve the internal processes as follows.

Developing the use of Electronic Records for storage of information for further analysis. It is a legal requirement to store data for at least five years.

- Developing the system of “delegated ordering” with identified departments ordering directly through POM for contract requirements. Some Departments have been used as pilot sites for this work, which will be an extension of the “framework agreements” currently in place.
- The e-procurement system has to be rolled out fully throughout the Trust and the e-invoicing system should be fully integrated as well. Currently only few suppliers have this facilities. Once security is reassured through track record and Trust is built with suppliers then e-invoicing should be easy. In fact the Trust has

developed a web portal website detailing supply opportunities and how to do business with the Trust.

- Apart from these internal processes the following are also under consideration:
- Effective use of the current e-contract management system (OPTIMise).
- Effective use of the e-lease management system

6.1.7 Customer Service

The Procurement Department needs to develop its customer service to all parts of the Trust to ensure that e-procurement users receive a service that adds value and is used by choice and not just because users have to use that route. Improved communication is a cornerstone in the development of improved customer service. Users need to know who to contact with specific problems or advice.

The following key actions are recommended to improve customer service:

- Develop an e-procurement procedure and guidance document explaining what the department does and how it does it and circulate to all users. This will be placed on the Public Folders of the Trust's Intranet.
- Undertake periodic internal customer surveys to gauge internal satisfaction with the e-procurement function.
- Identify areas of weakness from the survey and then establish and implement improvement plans.
- Develop a communications method to ensure dissemination of information.
- Ensure all customers have latest telephone list and department contacts.
- Develop internal training for existing and future users of the service.
- Further develop existing good practice such as the role of the Top-up clerk to foster closer working relations so that users feel that suppliers' staffs are working on their behalf.
- Review the current system of Procurement Department staff having responsibility for specific Divisions and consider other methods for effectively managing the interface with Trust departments, Divisions & Directorates.
- Provide customers with information to assist in their local supply management such as expenditure by commodity or supplier and work with the customer in developing improved solutions ensuring all parties have ownership of the process.
- Implement an effective and customer friendly helpdesk and telephone system which ensure that Trust staffs are directed to appropriate e-procurement team with the minimum of delay.

6.1.8 Partnership and Co-ordination.

The Trust recognises that benefits will not be obtained by working in isolation but by working with the wider NHS community. Benefits through improved contract prices or development of good procurement practice can best be achieved by developing close links with other parts of the supply network to ensure that the Trust keeps abreast of the rapidly changing procurement arena. In order to maximise benefit a sharing of the Contracts Work plan of the Purchasing and Supply Agency (PASA) to avoid duplication with the Trust Work plan is essential. In fact this should be strengthening with regular review meeting with the Customer Relationship Manager with

other NHS Trust. Since e-procurement is relatively new, developing a benchmark and identification of best practice and possible joint contracting with other London teaching hospitals and trusts is essential. Unfortunately so far only 35% of Trust across the country has implemented e-commerce and e-procurement.

6.1.9 Human Resources.

The Procurement Strategy creates an environment for change that will continue to challenge staff currently working the e-procurement. Initially procurement has undergone significant changes in both structure and personnel. The introduction of an Associate Director of Procurement, Medical and Non-Medical Purchasing Managers, Procurement Systems and Supply Chain Managers have strengthened the senior management in order to meet the Trust's targets and improvements. The strategy will continue to change the way the department operates and how it communicates both internally with customers and externally with suppliers. It will influence the structure of the department and bring about the requirement for new and enhanced skills for each member of staff. The Trust needs to consider how any changes will affect individual members of staff and how these are to be best handled within overall Human Resource policies. Attempts have to be made to increase the number of professionally qualified (Membership of the Chartered Institute of Purchasing and Supply) staff in the Trust and train purchasing staff on tendering and contracting methods and procedure. Cost Centre budget holders should also gain training on how to use the e-procurement system correctly and they should be made aware of all the functionalities available.

6.2 Financial evaluation of cost implications for the Organisation and its stakeholder, shareholders in particular as a result of implementation of e-procurement.

A cost evaluation and forecast was done for the Study Site and particular attention was given to the finance department and procurement department supplementary cost with regards to its current e-procurement system.

A cost analysis was done for the study site to show the implication of e-procurement as above. The staff cost was around £500k higher initially. This cost was mainly as a result of temporary hire of agency staffs to help with the implementation stage of the system. A new section was also created which was the "Approver". The main function of the approver was to approve orders once a requisition was raised by the budget holders. Approvers also have the task to check if the budget holders had enough funds before placing an order. Orders are placed with approved suppliers initially to take into account any discount available to the Trust. A slight decrease in pay of £300k was anticipated in year 4 which almost doubles in year 5.

There was an additional cost for the software which was leased and maintained by a third party. The overall cost was nearly £1.4m over a period of six years. A budget for training and upgrade PC was also made to cope with staffs turn over across the Trust. The EDI (Electronic Data interchange) license was going to increase over the next few years since more suppliers will be encourage to link with the Trust e-procurement system. The main cost saving would come from discount from suppliers. Initially the savings was expected to be 5% across Drug expenditure which was hoped to be increase to a target of 10% as the system was fully implemented. A prerequisite for this discount was the swift payment of suppliers within 30 days. The current creditors days was

around 72 days but with the implementation of e-invoicing and payment by BACS, a target of 45 days and 30 days was anticipated by year 3 and 4 respectively. In fact the Trust has set up few suppliers on advance payment to take advance of this discount. The Trust spends around £160m on non-drug items and it is anticipated that by consolidating orders, synchronising deliveries, bulk buying and making best use of e-auction functionalities, a modest saving of £600k is achievable by year 4. The forecasted saving is around £1m in year 4 and going up to £1.7m in year 7. This is a good return on tax payer money and the funds will undoubtedly be reinvested in the Trust service development plan.

Table 6: Financial implication

Pay cost	Pre-Eprocurement	Post-Eprocurement							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	
Material Management	£0	£137,000	£137,000	£120,000	£87,000	£87,000	£87,000	£87,000	
Procurement	£841,000	£841,000	£841,000	£841,000	£841,000	£841,000	£841,000	£841,000	
Approver	£0	£141,000	£141,000	£94,000	£68,000	£68,000	£68,000	£68,000	
Receipt and Distribution	£875,000	£875,000	£754,000	£669,000	£669,000	£669,000	£669,000	£669,000	
Account Payable	£1,579,000	£1,826,000	£1,711,000	£1,210,000	£928,000	£896,000	£896,000	£896,000	
	£3,295,000	£3,820,000	£3,584,000	£2,934,000	£2,593,000	£2,561,000	£2,561,000	£2,561,000	
Non Pay Analysis	Pre-Eprocurement	Post-Eprocurement							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	
E Procurmenr lease cost	£0	£265,000	£265,000	£265,000	£265,000	£265,000	£85,000		
Infratrucuture cost	£0	£150,000			£150,000				
Server and PC	£0	£100,000		£100,000		£100,000		£100,000	
EDI License for supplier	£0	£5,000	£20,000	£35,000	£35,000	£35,000	£35,000	£35,000	
Maintenance contract	£0		£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	
Training cost	£50,000	£50,000	£100,000	£100,000	£100,000	£100,000	£100,000	£100,000	
Non Pay discount	£0	-£290,000	-£348,000	-£580,000	-£580,000	-£580,000	-£580,000	-£580,000	
Consumable standardisat	£0	-£200,000	-£400,000	-£600,000	-£600,000	-£600,000	-£600,000	-£600,000	
	£50,000	£80,000	-£358,000	-£675,000	-£625,000	-£675,000	-£955,000	-£940,000	
Total cost	£3,345,000	£3,900,000	£3,226,000	£2,259,000	£1,968,000	£1,886,000	£1,606,000	£1,621,000	
Savings		-£555,000	£119,000	£1,086,000	£1,377,000	£1,459,000	£1,739,000	£1,724,000	

Note: - This analysis did not take into account cost of capital and inflation increase and no pay awards due to staffs.

7. Innovative recommendations of appropriate and effective operations management strategy deployment for the Study Site

7.1 *Supplier and Contract Management*

The number of suppliers and contractors with whom the Trust intends to conduct e-procurement must be rationalised. In doing so a significant saving and contract terms can be achieved. Bartels et al 2004 found that firms adopting such practices do in fact centralize corporate-wide purchasing policies, standards, technologies, and the actual execution of sourcing to the relevant departments and employees. The study site because it is a large organisation, is in a better position to centralise its purchasing resources and stands to gain more financially from price discounts they can extract from major suppliers. In keeping with focusing the firm's energies on a highly select group of suppliers, it is also suggested that the Trust tries to understand its preferred suppliers' technology plans and their future abilities to respond to future business information systems requirements and involving them in planning for e-procurement initiatives such as the "Supplier Councils". Large customer companies appear to be able to keep a tighter rein on their suppliers' network when it comes to implementing IT infrastructure requirements. However because e-procurement is still new, it is still a major challenge to get suppliers to participate fully in e-procurement initiatives and ensuring that they adopt the appropriate technologies to make these initiatives work.

This rationalisation of suppliers will also minimise unconventional buying where goods or services are purchased without using the Trust's formally defined processes and authorised vendors. Unconventional buying has a number of deleterious effects such as it deprives the firm of the ability to collect data on its employees' spend patterns and therefore loses visibility and control over its expenditures and it normally raises procurement costs as compared to purchases negotiated by Trust's purchasing professionals. Unconventional buying can be eliminated by presenting end users with a highly efficient and easy to use e-procurement system that will lure them away from old purchasing habits.

7.2 *End user behaviour and e-procurement business processes*

The end users have the greatest impact on the success of the e-procurement. The end users are very much so influenced by redesigned business processes and tend to behave accordingly to conform to the new systems procedural guidelines through the computerised business rules programmed in the e-procurement software the Trust decides to implement. The end users have to be involved though at the implementation stage or even earlier from the consultation stage to booster its uptake.

The current processes have to be continually being revisited to look into the opportunities of rationalizing the flow of transactions and information both within the Trust and with its suppliers through IT. Scanning the invoicing and e-invoicing has made a huge contribution in reducing the time taken to get invoices authorise and approved for payment. Also currently the system is maintained by an external contracted and it is recommended that the Trust centralise control of this function and employs dedicated IT professional to maintain the e-procurement system. This should improve better control over product data, catalogues and price updates for

indirect procurement to gain greater control over its sources of supply, purchase price and inventory policies. Containing data within the Trust will avoid the risk for a third party using Trust data for commercial purposes.

7.3 *E-procurement infrastructure and information*

The Trust currently has only a buy side functions but other options like sell side and marketplace/e-auction should be considered. The e-auction function is not used or developed as yet. Because the Trust also sells some of its services to other NHS and Private customers, the sell side function should be developed as a priority. Trust may have to update its infrastructure since the current electronic environment cannot meet all these three options. This upgrade is vital if the Trust wishes to create linkages with most of its suppliers. The current lease cost is £265k per year and upgrading it to full functionality is only marginal and the estimated incremental cost is around £120k per year extra.

7.4 *System integration and Cost transparency.*

E-procurement systems are relatively recent development in the business areas and there is lack of benchmark reference models. Consequently a lack of base infrastructure standardisation will result in back-end integration issues to collect data from more than one e-procurement system. Another challenge is software immaturity. The current system lacks features like invoicing (Account receivable side), payment, reconciliations, authentication, security and consolidation of general ledger and invoicing systems. Thus the e-procurement has to be used in conjunction with the general ledger. Another factor the Trust needs to consider is the financial penalty of not paying attention to hidden cost which can eat in the realised savings. Hidden cost could come from areas like system integration, catalogue update, search engines maintenance, transaction management, supplier enablement, and end user training and overall administration costs. It is recommended that the Trust demands more information on cost transparency in dealing with the software vendor and service provider and be vigilant in querying reference companies that have previously launched similar e-procurement projects to avoid misleading feedback.

7.5 *End user resistance and immature market place*

This consists of the underdeveloped providers of e-procurement services, lack of preparation of certain suppliers a customer may be dealing with and the resistance of the Trust employees to learning multiple e-procurement systems. The market place may not have the required fund to implement systems that can provide a complete package of services to its customers. Thus investing in more advance and complex system may not be a good viable option for the Trust since the implementation may fall short of expectations. Although most top suppliers are probably technologically sophisticated, the Trust should consider underwriting some of the costs of bringing its preferred suppliers up to par when it comes to very specific e-procurement implementation requirements. Especially if the cost benefit outweighs the initial investment.

There will always be resistance among end users to learning how to use multiple e-procurement systems especially when older and competing means of purchasing are still supported by the Trust such as use of procurement card and paper requisitions. It is recommended that the Trust should encourage the learning of the

e-procurement systems through intensive training and educational sessions with end users and employees and also rewards them when possible by deploying easy to use upgraded desk tops purchasing systems for example. The paper requisition and procurement card should eventually/gradually be stopped. The purchasing experience should be practically effortless so that workers in the Trust are able to focus on more important and value added activities that are more critical to their job. To this end it is recommended to increase the establishment of the procurement staff by an additional 4 posts namely customer care service personnel to help cost centre managers in their day to day ordering issues. The training budget should be maintained as they are now or increase if possible at all.

7.6 Computerised rules

Currently there is a workflow rules embedded into the system based on the value of the item. This means that any item will go through more than one department and management before it gets authorised. There may be unnecessary delay especially when goods are required for urgent cases where patients need those drugs and consumables fairly quickly. Also some of the goods although they require higher level management authorization, they may not know the details behind the deal especially for large organisation like the NHS. So it is recommended that for non-consumable and drugs item, the authorisation limit for middle managers to be increased from £15k to £50k whilst capital purchases have to go through the current procedure to maintain good financial management and financial control. The system should also be able to alert managers on price changes for certain goods above threshold levels so that a specialist buyer can investigate and procure from different supplier if necessary. Since the system also have section's budgets in it, rules can be set up to highlight areas where goods are bought without a predefined budget. This should deter managers to spend more than they are budgeted for.

7.7 Budget and evaluation methods for recommended organisation's Operations Management strategy implementation.

A budget has been set for the proposed recommendation as detailed in table 6 above. The implementation of the recommendation will release some additional cost saving and for the Study Site it would be around £660k over the next six years. Although the financial gain is not a large saving but the operational gain is significant and in fact will strengthen the process flow and will ensure that the initial savings from table 5 i.e. a total saving of £6.9m is realised by year 8.

In order to ensure maximum benefits are obtained from the system implementation and additional resources, each aspect of the strategy has to be monitored. One way of doing so is the use of key performance indicators (KPI). The current targets represent the current position of the Study Site and there after forecasted targets have to be set which match the level of investment and expectation. The KPI are best monitored on a quarterly basis so that any deviations from planned could be investigated and corrective actions taken.

Table 7 Budget implication

Pay cost	Pre-Eprocurement	Post-Eprocurement							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	
Material Management	£0	£137,000	£137,000	£120,000	£87,000	£87,000	£87,000	£87,000	
Procurement	£841,000	£841,000	£841,000	£841,000	£841,000	£841,000	£841,000	£841,000	
Approver	£0	£141,000	£141,000	£94,000	£68,000	£68,000	£68,000	£68,000	
Receipt and Distribution	£875,000	£875,000	£754,000	£669,000	£669,000	£669,000	£669,000	£669,000	
Account Payable	£1,579,000	£1,826,000	£1,711,000	£1,210,000	£928,000	£896,000	£896,000	£896,000	
IT professionals			£90,000	£90,000	£90,000	£90,000	£90,000	£90,000	
Customer Care staffs			£80,000	£80,000	£80,000	£80,000	£80,000	£80,000	
	£3,295,000	£3,820,000	£3,754,000	£3,104,000	£2,763,000	£2,731,000	£2,731,000	£2,731,000	
Non Pay Analysis	Pre-Eprocurement	Post-Eprocurement							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	
E Procurement lease cost	£0	£265,000	£265,000	£265,000	£265,000	£265,000	£85,000		
Infrastructure cost	£0	£150,000			£150,000				
Server and PC	£0	£100,000		£100,000		£100,000		£100,000	
EDI License for supplier	£0	£5,000	£20,000	£35,000	£35,000	£35,000	£35,000	£35,000	
Maintenance contract	£0		£5,000	£5,000	£5,000	£5,000	£5,000	£5,000	
Training cost	£50,000	£50,000	£100,000	£100,000	£100,000	£100,000	£100,000	£100,000	
Non Pay discount	£0	-£290,000	-£348,000	-£580,000	-£580,000	-£580,000	-£580,000	-£580,000	
Consumable standardisat	£0	-£200,000	-£400,000	-£600,000	-£600,000	-£600,000	-£600,000	-£600,000	
Supplier Rationalisation			-£50,000	-£150,000	-£400,000	-£400,000	-£400,000	-£400,000	
E Procurement infrastructure cost			£120,000	£120,000	£120,000	£120,000	£120,000	£120,000	
Main supplier system integration			£100,000		£100,000		£100,000		
More PC			£50,000	£50,000	£50,000	£50,000	£50,000	£50,000	
Computerised rule savings			-£200,000	-£200,000	-£200,000	-£200,000	-£200,000	-£200,000	
	£50,000	£80,000	-£338,000	-£855,000	-£955,000	-£1,105,000	-£1,285,000	-£1,370,000	
Total cost	£3,345,000	£3,900,000	£3,416,000	£2,249,000	£1,808,000	£1,626,000	£1,446,000	£1,361,000	
Summary	Pre-Eprocurement	Post-Eprocurement							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	
Total cost pre recommend	£3,345,000	£3,900,000	£3,226,000	£2,259,000	£1,968,000	£1,886,000	£1,606,000	£1,621,000	
Total cost post recommen	£3,345,000	£3,900,000	£3,416,000	£2,249,000	£1,808,000	£1,626,000	£1,446,000	£1,361,000	
Additional savings	£0	£0	-£190,000	£10,000	£160,000	£260,000	£160,000	£260,000	
Total additional savings	£660,000								

8. Conclusion

The NHS as a whole is undergoing rapid changes although the uptake of e-procurement has been low in recent years. The grant made available by the central government should encourage more Trusts to join the e-

procurement initiatives and realize cost savings. The study site demonstrated that significant cost savings are achievable although it is currently limited by the immature market place. It is anticipated that more commercial businesses will adopt e-procurement in the future which will further transform NHS operational processes and make those estimated cost savings more realizable.

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