

## A FRAMEWORK FOR THE IMPLEMENTATION OF E-PROCUREMENT

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### ABSTRACT

e-Procurement is a sound solution for companies to initiate e-business initiatives since it promises several distinct benefits, such as process cost and lead time reduction, improving strategic sourcing of commodities and enabling companies to negotiate better prices. Procurement is a broad term that touches on internal and external aspects of the company, complicating the decision to choose the most suitable e-procurement solution. An evaluation framework is proposed to assist in evaluating the susceptibility of a company's products to e-procurement and choosing the most suitable e-procurement solution.

### OPSOMMING

e-Verkryging is 'n goeie beginpunt vir maatskappye om hulle aan e-besigheid bloot te stel aangesien dit verskeie voordele soos proses koste en leitydvermindering, verbetering van strategiese aanskaffing van produkte en die vermoë om beter pryse met verskaffers te onderhandel, beloof. Verkryging is 'n breë term wat heelwat aspekte binne en buite die onderneming behels. Dit bemoeilik die besluit om die mees geskikte e-verkryging-oplossing te kies. 'n Evalueeringsraamwerk word voorgestel ter ondersteuning van die evaluering van die ontvanklikheid van 'n onderneming se produkte vir e-verkryging en die keuse van die mees geskikte e-verkrygingoplossing.

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## 1. MOTIVATION FOR AN E-PROCUREMENT FRAMEWORK

The introduction of the Internet has challenged numerous value chain propositions and processes. Its low cost, low barrier of entry and timely distribution of information provides a seamless extension of processes across company borders. Initial scepticism about the business benefits of e-procurement is now being replaced by recognition of the value of e-procurement for business, be it through process improvements, improved management or actual cost savings.

According to Elliff [7], e-procurement is any purchasing-related activity that involves electronic communication, such as the Internet or related software, to help companies achieve increased value. From point-and-click ordering using Web-based catalogues of individual suppliers to marketplaces that bring together in one place the products or services offered by multiple suppliers to live auctions that determine the lowest-price bidder.

e-Procurement is a sound solution for companies to initiate the e-wave as it promises great cost savings (Thompson *et al.* [29]). Savings promised include a reduction in processing cost, reduction in the supply base (which leads to cost savings) as well as negotiating better prices through the availability of sufficient post-purchase information. Maverick spending (off-contract purchasing) is also reduced through better-controlled purchases.

Laub *et al.* [18] conducted research among a number of companies that have implemented e-procurement, but did not achieve the claimed savings or improvements. A large percentage of the respondents acknowledged that they had become involved with e-procurement through management pressure to become involved with anything “e”. These companies admitted that their implementation revolved more around making the technology work rather than ensuring that it fitted into the current business structure. By following a selection framework such errors would not have been made.

According to Milton *et al.* [23], “As many companies lack experience purchasing e-procurement solutions, it can be helpful to seek objective assistance, ensuring evaluation processes are completed and objective, and *allowing for the selection of well suited software.*”

According to Thompson *et al.* [29], businesses are competing increasingly in supply chain management. It is therefore vital that the choice of an e-procurement solution, as well as the planning and installation, should involve much more than only system aspects and should also include:

- Strategic procurement and its process.
- Supplier selection, -management and -relationship.
- System business models.

The system business model chosen has a significant impact in terms of integration of the buyer and supplier, as well as the maintenance and content management to be performed.

## 2. PROCUREMENT AND E-PROCUREMENT DEFINED

### 2.1 What is Procurement?

Whilst purchasing mainly describes the process of buying (learning of need, locating and selecting a supplier, negotiating price and other pertinent terms and following up to ensure delivery), procurement is a somewhat broader term that includes aspects such as stores management, traffic, incoming inspection and salvage (Hugo *et al.* [13]). Lambert & Stock [18] adds that purchasing generally refers to the actual buying of materials and those activities associated with the buying process. Procurement is broader in scope and includes purchasing, traffic, warehousing and receiving materials. Procurement is therefore all actions necessary to close the complete purchasing cycle.

Due to the fact that procurement is an all-encompassing function, an adequate e-procurement solution should encompass all procurement-bordering aspects to realise the full value. The following table indicates the procurement actions that are addressed by purchasing, procurement or e-procurement respectively.

Activity	Purchasing Actions	Procurement Actions	e-Procurement
<i>Providing uninterrupted material flow</i>	X	X	X
<i>Vendor selection and management</i>	X	X	X
<i>Procurement process improvement</i>		X	X
<i>Maintaining product quality</i>		X	
<i>Materials handling</i>		X	
<i>Standardising supply</i>		X	X
<i>Improving company competitiveness</i>		X	X

**Table 1: Addressing Various Procurement and Bordering Actions**

From the above table, it is clear that procurement involves several aspects not addressed in purchasing. e-Procurement addresses the bulk of these actions, but does not improve or impact on materials handling or maintaining product quality. e-Procurement is therefore a tool to assist companies to buy the right requirements (quality) in the right quantities at the right time at the right price from the right supplier and does so by empowering the end user to largely control the purchase.

### 2.2 Strategic Sourcing

Strategic sourcing is the process of optimising the total acquisition cost of materials and services (Louw [20]). This implies definitive supplier relationship and -management strategies for each category of materials or services bought. Technology such as e-

procurement is therefore tools that can be used to minimise the cost of acquisitioning materials.

Hence, e-Procurement is merely a catalyst for change, driving compliance and sustaining value delivered to a company's strategic sourcing policy. It is imperative that companies consider e-procurement and its value from a process and strategic sourcing point of view rather than from a technology viewpoint.

### 3. OPERATIONAL IMPACT OF E-PROCUREMENT

Thompson *et al.* [29], Richardson [27] and Neef [24] mention that e-procurement's benefits are primarily seen in the indirect purchasing domain (goods and services that are not linked direct to the manufacturing systems) with the following major benefits:

- Reach that allows suppliers to access new customers and buyers to find new suppliers.
- The ease of exchange of information that provides supply chain partners with a “dashboard-type of view” of orders and service performance.
- Increased accuracy of information by reducing the number of data-entry points within the process. Key information is only entered once.
- Electronic routing that eliminates the problem of lost documents and the requirement for manual tracking. This makes for increased control and accountability for business procurement.
- Real-time tracking of order status.
- Payment for purchases can be automatically triggered upon matching of the invoice with the delivery note and the purchase order (occurs automatically). Although it does not necessarily imply automatic payment, integration with Electronic Funds Transfer (EFT) or Procurement Card (P-Card) solutions would automate the total procure-to-pay process.
- Reduced administration cost, as well as reducing the administration burden of purchasing professionals in an organisation.

The following table lists a number of unnecessary costs associated with the procurement process (Laaper [16]) and summarises how e-procurement aims to reduce these costs.

Although e-procurement automates some actions in the procurement process, it also provides tools for measuring and management procurement in broader terms in organisations.

According to Thompson [29] one of the main reasons for an e-procurement venture is to reduce costs. According to McLeod [22] the average cost of stationery orders at First Rand Bank was reduced from R210 (sometimes larger than the total order value) to R50 per order. Of the initial R210 cost per order only about R15 refers to consumables. The rest is the cost of employees previously allocated to the process who can be applied elsewhere (such as with

more strategic aspects) after the implementation of an e-procurement solution. Companies implementing e-procurement seldom realise any bottom-line saving and the total financial impact is difficult to justify. This has contributed to the slow initial adoption rate of e-procurement in companies.

Associated Procurement Costs	Solution Through e-Procurement
<i>Maintaining a larger-than-needed supplier base.</i>	With the bulk of e-procurement based on catalogue spending, companies can control from which companies purchases are made. This has a follow-on effect of a reduced supplier base.
<i>Obtaining larger-than-needed volumes</i>	e-Procurement contributes to companies better controlling their purchasing. Through data analysis companies can reduce spending per product type.
<i>Lack of standardisation</i>	Each product type follows a standardised process in e-procurement through approval to requisitioning
<i>The cost of extended lead and cycle times.</i>	Longer-than-necessary lead time results in carrying unnecessary safety stock. e-Procurement provides a vehicle to track fulfilment more effectively, providing MIS for improved supplier management.
<i>The cost of order processing and receiving.</i>	e-Procurement simplifies order processing. Costs associated with receiving can be reduced if the system is integrated with the correct back-end system to ensure a three-way check.

**Table 2: Reducing Procurement Costs Through e-Procurement**

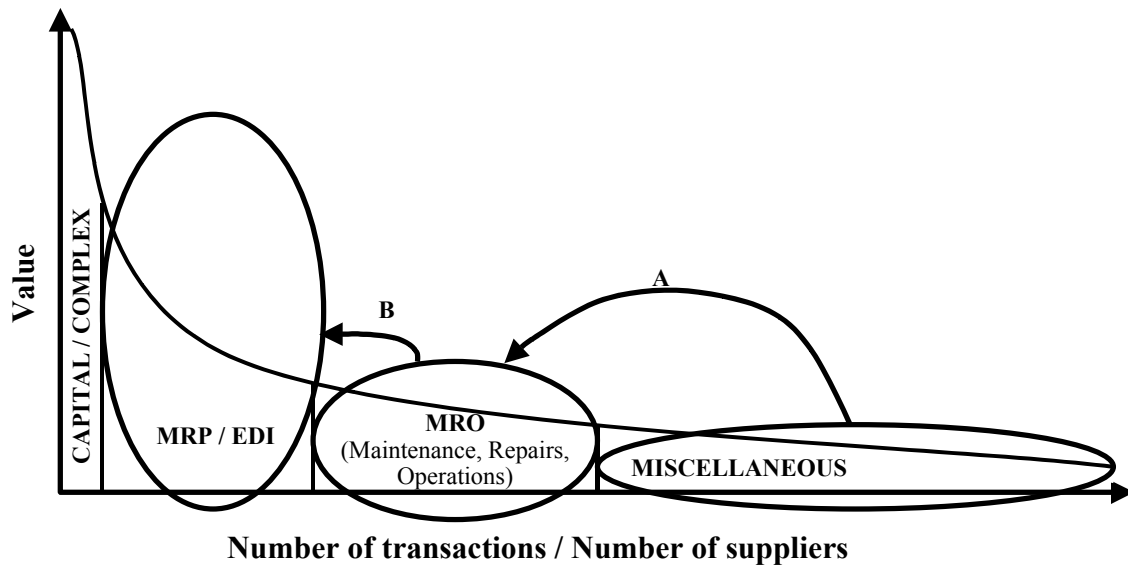
Increased control over purchases is one of the benefits that are difficult to quantify. Low-value high-volume purchases (usually in purchasing for consumption) frequently have a higher cost to procure than the value of the actual items being procured. Figure 1 indicates the control e-procurement has brought about (Shift A), while a further shift in control is required (Shift B) for “hands-free” procurement. (Adapted from Curtiss [6])

e-Procurement systems currently aim to control the uncontrolled maverick purchases (which according to Neef [24], in some companies total 30% of the total number of purchases) through increased contract usage and purchasing leverage with suppliers (shown as shift A in the above figure). e-Procurement systems should advance to use the contracted prices and make use of system-initiated transactions (shown as Shift B in Figure 1 below).

In summary, the value created by an e-procurement system falls into one of the following three categories:

- **Improving process efficiencies.** This includes automated requisitioning, automated workflow, eliminating double handling and less paperwork, shorter cycle time which results in less inventory.
- **Compliance.** This results in a reduction in maverick spending.

- **Leverage.** The system provides better management information on category and supplier spending. This will create leverage for negotiating better prices with suppliers.



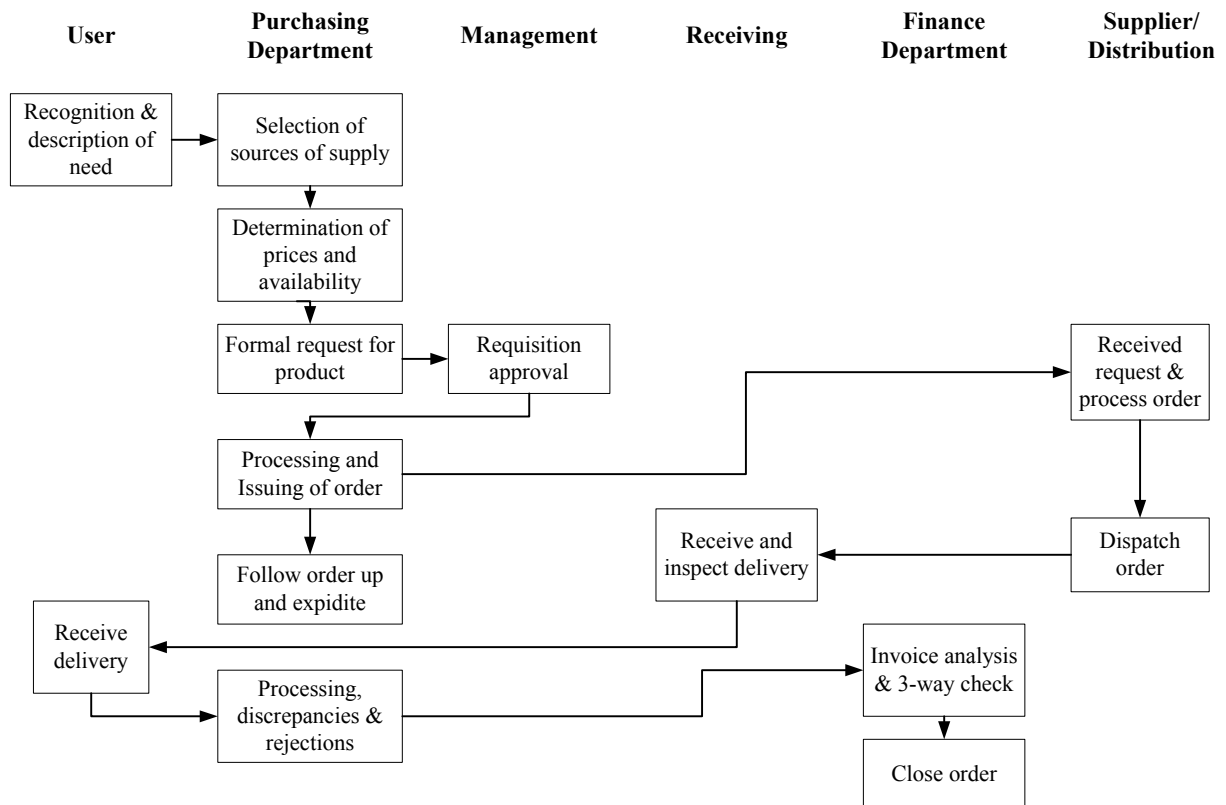
	Capital/ Complex	MRP/EDI	MRO	Miscellaneous
<b>Number of transactions</b>	Small	Large	Large	Huge
<b>Number of suppliers</b>	Small	Large	Large	Huge
<b>Purchasing Characteristics</b>	<ul style="list-style-type: none"> <li>• High value, once off</li> <li>• Complex and hands-on</li> </ul>	<ul style="list-style-type: none"> <li>• Product and retail based purchases</li> <li>• JIT and Kanban</li> </ul>	<ul style="list-style-type: none"> <li>• Consumption based</li> <li>• Contract pricing</li> </ul>	<ul style="list-style-type: none"> <li>• Unplanned, emergency or “maverick” purchases</li> <li>• Uncontrolled pricing</li> </ul>
<b>Order processing</b>	Manual	Automated	Manual	Manual

**Figure 1: Focus of e-Procurement**

### 3.1 The Procurement Process

Figure 2 represents a generic purchasing process before the implementation of e-procurement (Jooste [15] and Thompson *et al.* [28]).

It is clear that the traditional procurement process comprises numerous steps involving many people with different roles and responsibilities. If carried out on a large scale, purchasing processes easily become cumbersome, wasting valuable time and obliging personnel to carry out a constant fire-fighting approach to keep track of the paperwork generated at each stage. Especially the internal escalation of the order is frequently bypassed in companies by an informal approach in the hallway, telephone call or e-mail and complicates the purchasing function (Hough & Ashley [14]).



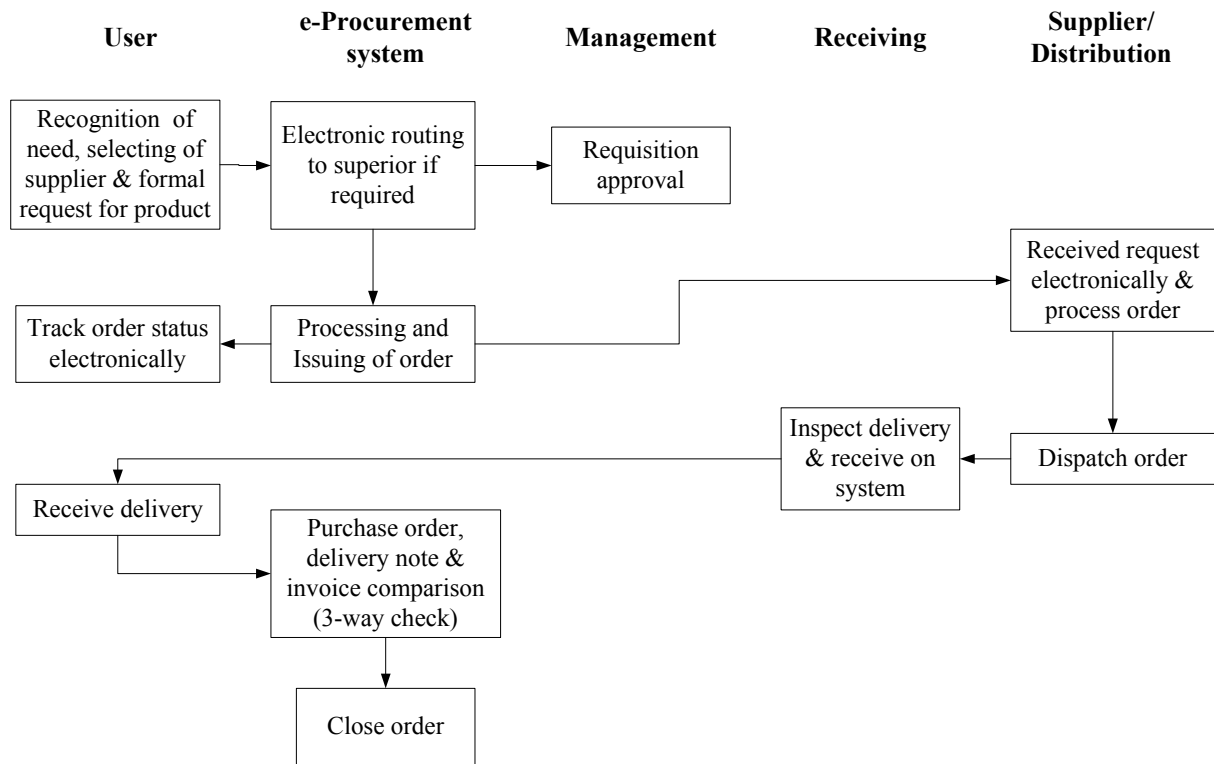
**Figure 2: The Traditional Procurement Process**

Implementing e-procurement not only radically reduces the number of process steps, but also automates a number of the remaining steps (7 of the 14 process steps in the e-procurement scenario are automated). The generic purchasing process when implementing e-procurement is presented in Figure 3 below.

### 3.2 e-Procurement and e-Business

According to Lee & Whang [19], e-business is the use of the Internet for computing and communications to execute both front-end and back-end business processes. e-Business has emerged as a key enabler to drive supply chain integration, of which e-procurement forms a part. e-Business impacts on supply chain integration in the following four key dimensions:

1. **Information integration.** This involves information sharing and transparency across the supply chain which is accessible in real time.
2. **Synchronised planning.** This involves collaborative planning and replenishment across the supply chain.
3. **Workflow co-ordination.** This focuses on automated business processes and co-ordinating them .
4. **New business models.** These include different supply- and sell-side models that were previously not present in the off-line world.



**Figure 3: The e-Procurement Process**

Table 3 indicates the impact procurement has on each of these integration dimensions (adopted from Lee & Whang [19]).

<b>Dimensions of Supply Chain Integration</b>	<b>Contribution of e-procurement</b>
Information Integration	Supplier information sharing. Both buyers and suppliers have the ability to access information in real time to track order progress.
Planning Synchronisation	Co-ordinated replenishment. e-Procurement with an efficient forecasting system could initiate orders automatically rather than manually, which will result in a pull rather than a push model.
Workflow co-ordination	Paperless procurement, auctions, auto-replenishment, auto-payment. e-Procurement automates the bulk of the ordering process. Integrating this with an automated payment system (such as EFT) could automate the total procure-to-pay process.
New Business Models	Market exchanges, auctions, secondary markets.

**Table 3: Impact of e-Procurement on Supply Chain Integration**



The Internet has allowed companies to develop innovative solutions that accelerated the adoption of supply chain integration principles. If implemented correctly, this promises not only to change supply chains from being adaptive to being responsive, but also promises savings across company borders that can result in less inventory and in improved fulfilment time in the supply chain.

### 3.3 e-Procurement Potential in South Africa

South Africa has very unique problems regarding the implementation of “first-world” technologies such as e-procurement. The following are typical problems (adapted from Louw [20]):

- *Limited and monopolised supply base.* On-line communities are most successful when they involve a large number of participants. South Africa has a relatively small supply base per commodity group and this is usually controlled by a few large participants. This reduces the possible impact of an on-line solution such as e-procurement.
- *Limited bandwidth.* Bandwidth is a precious commodity in South Africa. This negatively impacts on both the download of information and the upload of web pages. Consequently, users frequently abandon on-line processes before completion.
- *Social Responsibilities.* One of the acclaimed benefits of an e-procurement solution is a reduction in the supply base, which conflicts with South African BEE and SMME development objectives and legislation. Also these smaller players tend to be unsophisticated with very few having on-line access and being e-procurement ready.
- *e-Procurement affordability.* e-Procurement technology is advanced and costly to South African companies. Usually only large corporations with large expenditure on indirect purchases (such as MRO) consider such systems. This results in a very small percentage of potential “e-procurement purchases” being made on line. Also, implementation is usually not integrated with suppliers’ systems and the advantages of a totally integrated solution are seldom realised.

The reasons listed above give some explanation why South Africa has had a slower than average (compared to other countries) adoption rate of e-procurement solutions. To overcome the problems stated, a staggered implementation process is proposed. Companies should start with automating part of the process, such as using on-line auctions to negotiate some of their commodities’ contracts or implementing procurement cards. A procurement card is a solution that gives users permission to buy from certain suppliers within a spending limit. The result is improved control over purchases and automated payment, but does not promise all the collaboration and process savings associated with e-procurement.

## 4. PRODUCT SUSCEPTIBILITY TO E-PROCUREMENT

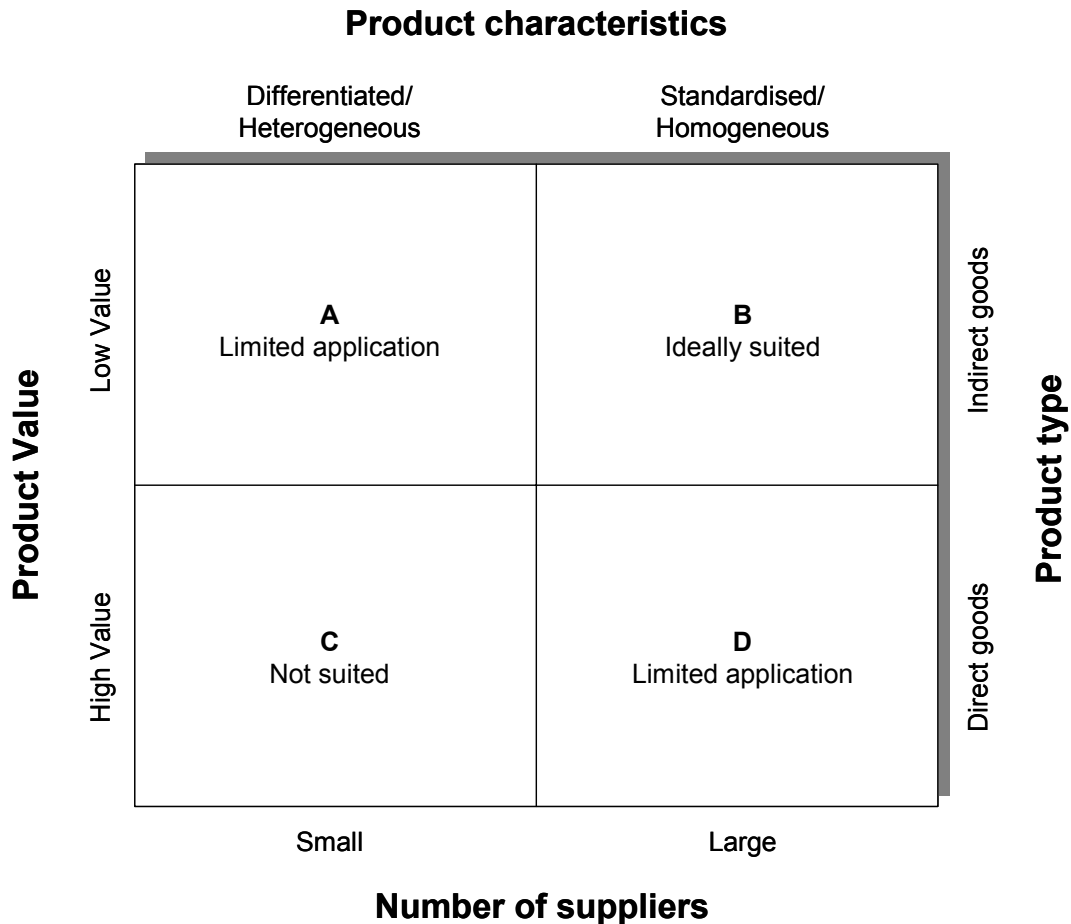
Thompson *et al.* [29] and Neef [24] distinguish between *direct and indirect products* procured in the business-to-business (B2B) procurement arena. Direct goods are items that contribute direct to company sales, being for production or resale. From the above categories, production material (raw material or components) and finished goods for resale reside here. Indirect

goods support the main line of business and can be seen as enabling goods. MRO, capital equipment, services, construction contracts and office supplies (also known as ORM or operating resource management) are included in indirect goods.

Fearon *et al.* [8] adds that products can be further distinguished into *standardised or differentiated*. A standardised (or homogeneous product) is one that is exactly like those produced by all the other producers of that product. Sellers of standardised products know that the market is very sensitive to price because it is relatively easy for buyers to comparison-shop. A truly differentiated product is different from all the other producers' products in some respect. That is, the product has some feature that no other product has.

Jooste [15] adds that the *product value* (ranging from very low to high item value) and the *number of suppliers* (a large or small supplier base) also influence the characteristics of a product.

All four of these different characteristics are not independent of each other. Product characteristics and the number of suppliers, for example, are directly proportional (homogeneous products are normally supplied by a large supplier base and vice versa). Figure 4 summarises the applicability of the above characteristics towards on-line buying or the tendency towards e-procurement.



**Figure 4: Product Suitability for e-Procurement**

Products are either well suited, not suited or have limited application to e-procurement. The four influencing factors contribute to a product's susceptibility to e-procurement as follows:

- ❑ *Function within the business.* Due to the uncontrolled spending as well the large procurement cost vs. the cost of the items procured, indirect goods are better suited for e-procurement.
- ❑ *Product characteristics.* Standardised products can be bought from a catalogue and require little manual intervention. They are therefore better suited for on-line buying.
- ❑ *Product value.* Items of lower value tend to require less negotiation compared to higher-value items.
- ❑ *Number of suppliers.* Products supplied by a larger supplier base achieve critical mass much easier than one with a smaller supplier base.

## **5. ROLE-PLAYER SUSCEPTIBILITY TO E-PROCUREMENT**

### **5.1 Buyer and Supplier Roles**

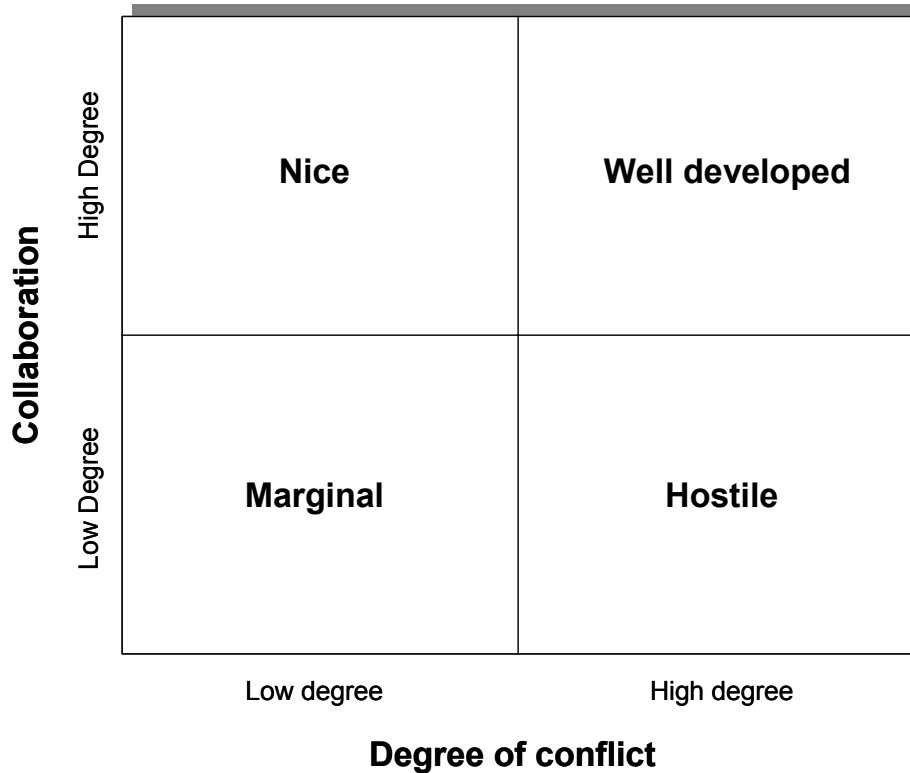
Procuring items involve at least two parties, the buyer and the supplier. According to Churchill & Peter [3], a number of different buying role-players are involved, such as the initiator (person who initiates the need for the product or the service), the user (person who will use the product or service), influencers (people who will affect the buying decision), deciders (people who will formally or informally approve the purchase or supplier) and buyer (the person who will select the supplier and negotiate contractual agreements). Parkinson & Baker [26] mention that behavioural aspects of these role-players such as their demographics, personality traits, attitude towards buying and perceptual patterns will all influence their decision and preferred way of purchasing.

The role-players involved on the supplier's side very much depend on the channel strategy chosen. Haas [12] distinguishes between numerous channel relationships which can be grouped as either direct (the manufacturing company uses salespeople to sell direct to its customers) or indirect (the manufacturing company uses an intermediary to sell its products on their behalf). Although the Internet has the potential to disintermediate sales channels by opening direct connections between manufacturers and end customers, Martin [21], Sculley & Woods [28] and Hagel & Armstrong [11] are of the opinion that intermediaries will not completely disappear. According to them, they will be replaced by infomediaries acting as brokers between buyers and sellers, shifting value from vendors to customers. These infomediaries will predominantly be systems providing information rather than dictating purchases and will also enable lower commissions to be paid to middlemen.

### **5.2 Relationships between Role-players**

Different parties within the value chain are involved in different relationships based on the role-players and relationship characteristics. Gattorna & Walters [9] distinguish between two types of relationship, namely vertical (between one or more supplier or buyer) and horizontal (between a buyer and a supplier). These relationships can in turn be characterised by either

co-operation or conflict, which in turn will determine how keen especially suppliers will be to participate in a buyer's e-procurement venture. These relationships are categorised in Figure 5.



**Figure 5: Collaboration and Degree of Conflict between Role-players**

Relationships with a low degree of collaboration will not be meaningful to either party - such relationships are either marginal (associated with a low degree of conflict) or hostile (associated with a high degree of conflict). Significant relationships come into being with a high degree of collaboration. A relationship with a low degree of conflict tends to be somewhat too 'nice', as the parties make too few demands from one another. Provided that it can be handled well, raising the degree of conflict in such a situation enables a better climate for innovation and development.

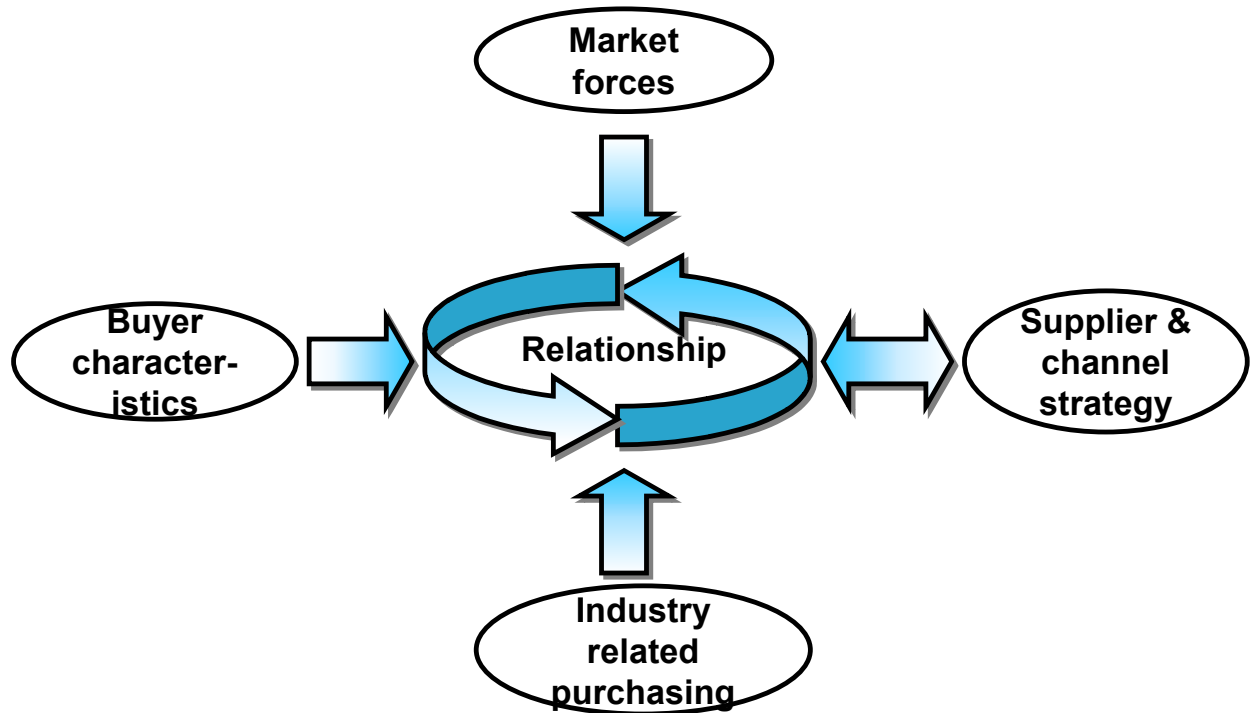
### **5.3 Market Forces and Industry-related Purchasing**

Viljoen [30] distinguishes between two broad groups of market competitiveness, namely perfect and imperfect competition (which includes monopolistic competition, oligopoly and monopoly). As e-procurement solutions favour buying of homogeneous products (mainly sold through perfect competitive and oligopolistic competitive markets), e-procurement will best suit perfect competitive and oligopolistic markets.

Each industry (such as manufacturing, service and retail) has a different approach to purchasing. On the one hand, the service industry mainly buys indirect goods such as office stationery, while the retail industry buys goods for resale in a market that is very volatile and changing continuously. e-Procurement prefers a stable environment where largely the same

products are purchased continuously, making its applicability less likely in the retail environment compared to the service and manufacturing sectors.

All the above characteristics influence the decision on an e-procurement solution. The following figure summarises the applicability of the above characteristics to on-line buying (tendency towards e-procurement).



**Figure 6: Role-players Influencing the e-Procurement Decision**

The aspects indicated in the above figure (buyer characteristics, market forces, supplier and channel strategy and industry-related purchasing) all impact on the relationship between the buyer and supplier. The relationship in turn also influences the supplier and channel strategy (the significance of the relationship, as well as the value generated for buyers, will determine if buyers would seek new relationships to buy similar products). All five the above forces will impact on a company's decision to implement an e-procurement solution.

## **6. E-PROCUREMENT BUSINESS MODELS**

Before the advent of the electronic means of exchanging information, most items purchased by companies were displayed in printed catalogues, depicting all relevant information pertaining to the item for sale. Thompson *et al.* [29] mention that the rise of databases and the increasing sophistication of interactive technologies have created a scenario where the benefits of hosting a catalogue are equally attractive to the purchaser. Unlike printed catalogues, which are effectively obsolete the moment they leave the printer, the hosted catalogue remains reliable on a 24-hour by seven-day basis if maintained effectively.

Berryman *et al.* [2], Welty [31] and Thompson *et al.* [29] mention three different e-procurement business model solutions for buyers to access suppliers' information on line:

1. *Do it yourself. (Buy-side solution).* Geller [10] compares the sell-side solution to a shopper who visits the various vendors of interest to look at the offerings and prices. According to Welty [31], the main advantage is that buyers avoid the headache and investment of reformatting their suppliers' product data themselves. Content-management is the problem of the vendor. Controlling purchases and comparison-shopping is, however, very difficult.
2. *Have your suppliers do it for you (Sell-side solution).* Geller [10] compares this to a travelling salesman where the sellers have to bring their wares to the buyers. Berryman *et al.* [2] and Welty [31] add that managing the electronic supplier catalogue in house gives the advantage of control, but requires a full maintenance team to perform content management. According to Neef [24], this model is more e-commerce than e-procurement.
3. *Neutral marketplace (centralised trading portal owned independently).* Geller [10] and Berryman *et al.* [2] mention that in the e-marketplace (also referred to as a portal), third parties set up department stores to connect buyers and sellers (and to match many buyers and sellers). According to CommerceOne [5], this marketplace enables consumers to link to a single portal and gain access to products, services, and information from multiple vendors. Wheatley [32] emphasises that products best suited for an e-marketplace are those that can easily be compared. Therefore standardised products fit better to a catalogue and are much easier compared to one another other.

Thompson *et al.* [29] also explain that the direction in which the solution is facing makes a significant difference to its functionality. Sell-side systems face outwards from the vendor towards the consuming companies and buy-side systems face out from the purchaser towards its supply chain trading partners. The marketplace resides in the middle, facing outwards to both the buyer and vendor. Buy-side solutions streamline the corporate purchasing process whereas sell-side solutions syndicate vendor product information in order to streamline the transaction processes of the seller.

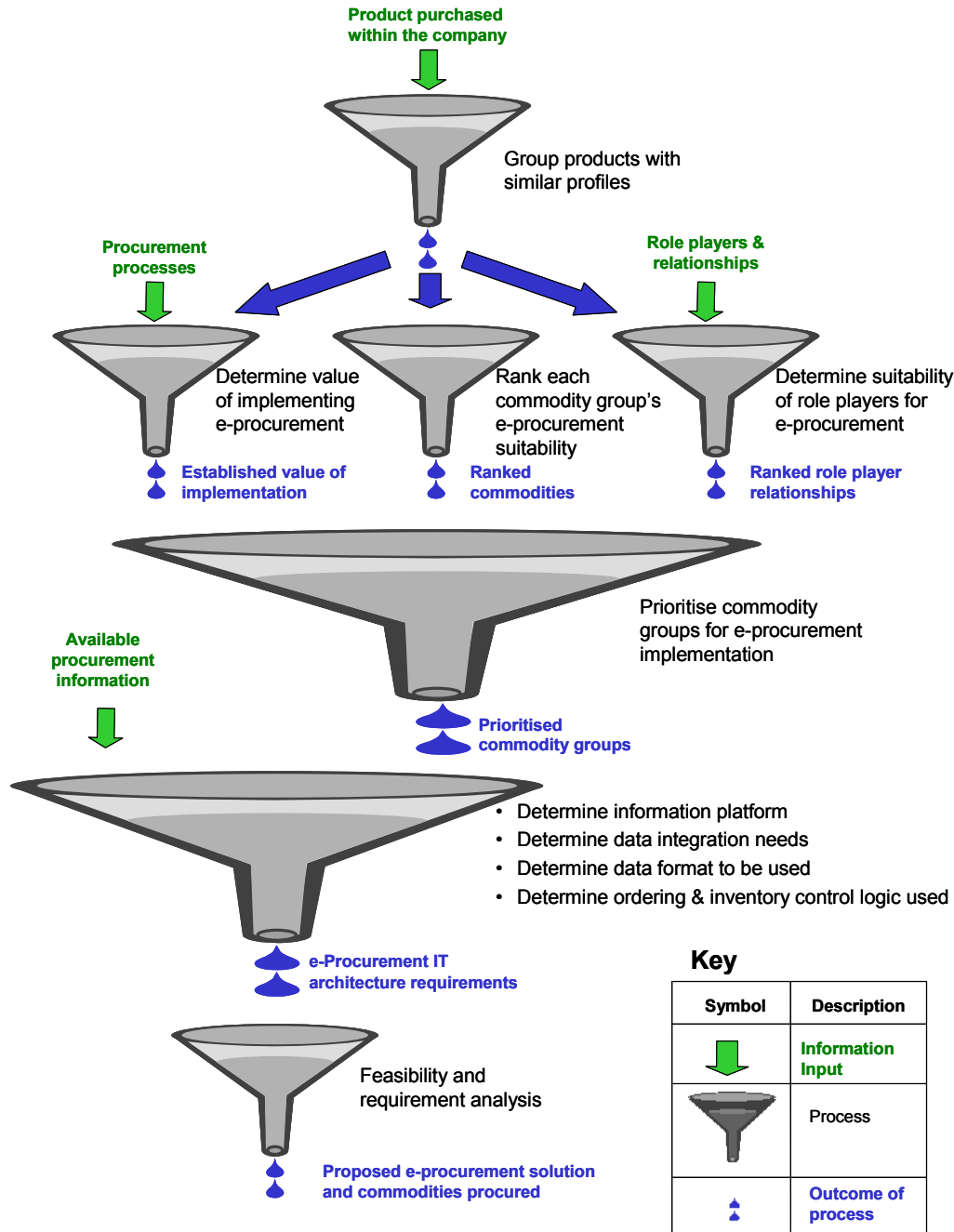
Of the three solutions, marketplaces hold the most advantages. One of the main advantages is the reduction in possible relationships (all relationships pass through the marketplace as opposed to direct between buyers and suppliers). Another advantage is the reduction in cost if compared to the buy-side or sell-side models. Users only have to pay a subscription fee that is far less than half of what it would cost to manage the process themselves (Welty [31]).

## **7. FRAMEWORK FOR E-PROCUREMENT IMPLEMENTATION**

The aspects discussed throughout the article support the establishment of a framework in one of two important ways: i) assisting in deciding if the purchasing aspect is relevant to e-procurement, and ii) choosing the correct e-procurement delivery solution. It is therefore important that the chosen framework should first rank and determine which products are suited for e-procurement and develop a suitable solution for the selected product groups.

Looking at the aspects discussed in the article thus far, the discussions on procurement and its process, as well as those on products and role-players, are used to rate and rank the delivery of e-procurement. Looking at the supply chain of these products as well as the trading exchange necessary for the system will assist in determining which is best suited for e-procurement. All these factors are combined into a proposed framework shown in Figure 7.

The framework follows a top-down logic with decisions made in higher “funnels” as an input to lower decision points (or “funnels”). The functioning of each of these decision points is discussed individually in the following paragraphs.



**Figure 7: Framework for E-procurement Implementation**

## 7.1 Grouping Similar Products

As companies usually buy a vast array of SKUs, it is suggested to group products with similar characteristics into commodity groups. Different strategies can be used to group the commodities, of which the following are probably the most common:

- ❑ Products with similar physical characteristics (e.g. bearings)
- ❑ Products with similar end users (e.g. stationery)
- ❑ Products with similar suppliers (e.g. electronic components)

## 7.2 Commodities Feasible for e-Procurement

The most important characteristic that determines if a commodity group is suited for e-procurement is the product itself. It is therefore important to rate each of the commodity groups' susceptibility to e-procurement. It is suggested to rate each commodity group according to the criteria discussed in Section 4, namely product value, product characteristics, product type and the number of suppliers. It is recommended to give each criterion a qualitative rating between 1 and 5. Although product value is quantitative, it has to be converted to a qualitative value between 1 and 5. Finally the average feasibility of the criteria needs to be determined.

## 7.3 Procurement and Process Feasibility

Each of the identified commodity groups probably has a unique procurement process, is purchased by different individuals and has a different consolidation process. It is important to understand the value proposed by using e-procurement. The following important criteria have to be considered:

- ❑ *Transaction value.* For each of the commodities, the average transaction value (total spent per commodity divided by the number of transactions for the same period) has to be determined. A qualitative value needs to be assigned, ranging from 1 (low transaction value) to 5 (high transaction value).
- ❑ *Process inefficiency.* Determine the current process's inefficiency, compared to that of the proposed e-procurement solution. Although a quantitative approach of activity-based costing can be used, a qualitative rating based on the evaluator's opinion would suffice. A rating from 1 (all products in the commodity group are purchased through a very efficient process) to 5 (all products in the commodity group are purchased through a very inefficient process) should be assigned.
- ❑ *Contract purchasing.* Determine what part of the commodity spend is on-contract vs. what part is off-contract. A qualitative value ranging from 1 (no products in the commodity group are ever purchased off-contract) to 5 (all products in the commodity group are frequently purchased off-contract) is suggested.

An overall rating for all three criteria should be determined and it is recommended to use the average rating for the three aspects.



## 7.4 Role-player Feasibility

For each of the identified commodity groups, the criteria as discussed in Section 5 should be used to determine the role-player feasibility, i.e. the following:

- ❑ *Buyer characteristics.* Each of the commodities' buyers involved has to be evaluated. Aspects such as their susceptibility to e-procurement and the existence of purchasing control have to be evaluated. A qualitative value ranging from 1 (buyers of the products in the commodity group will realise little value through using e-procurement) to 5 (buyers of the products in the commodity group will realise a large amount of value by using e-procurement) is suggested.
- ❑ *Supplier and channel strategy.* For each commodity group, the relationship with its suppliers has to be evaluated (being either cohesive or conflicting). The existence of any horizontal or vertical relationships in which the buying company is involved should also be considered. Scoring of the supplier and channel strategy pivots on the existence of a constructive relationship (high rating) vs. deconstructive relationship (low rating). A qualitative value ranging from 1 (a deconstructive relationship exists between buyers and suppliers of the products in the commodity group) to 5 (a constructive relationship exists between buyers and suppliers of the products in the commodity group) is suggested.
- ❑ *Market forces.* Each commodity is purchased in a market where certain forces prevail (or are absent). It has to be determined whether each commodity is purchased in a perfect (high rating) or imperfect competitive market (low rating). A qualitative value ranging from 1 (all products in the commodity group are purchased in an imperfect competitive market) to 5 (all products in the commodity group are purchased in a perfect competitive market) is suggested.

An overall rating for all three criteria should be determined and it is recommended to use the average rating for these criteria.

## 7.5 Prioritise Commodity Groups for e-Procurement

Different aspects of the susceptibility of a commodity group to an e-procurement solution are discussed in paragraphs 7.2 to 7.4. All three of these aspects have to be combined into a single rating for the commodity groups. Weighting of each of the three sets of criteria depends once again on the company, but an equal weighting is recommended.

## 7.6 Information Exchange and Order Initiation Solution

Each of the commodity groups has received three ratings in terms of its susceptibility to e-procurement. Before it is decided which products to procure through an e-procurement solution, the systems and data requirements for such a system should be identified. The following should be considered:

- *System platform.* Depending on the number of users and suppliers, a choice has to be made between the Intranet, Extranet or Internet. Due to its reach and ease of access the Internet will in most instances be the platform of choice.
- *Systems integration.* The current systems used for purchasing the different commodities have to be evaluated. These could include ERP or legacy systems, EDI solutions, etc. that will determine the integration that would be required should e-procurement be implemented.
- *Information and data format.* Based on the system integration needs, the data format requirement should be established. Where EDI solutions exist, the possibility of using XML and its impact should be evaluated.
- *Business model.* Companies have to choose between buy-side, sell-side or marketplace solutions. Also choosing between catalogue solutions vs. ERP/legacy-based solutions has to be considered.
- *Order initiation.* Analyse if orders are generated on demand or forecast and how orders are generated (JIT, MRP, by end users, etc.). Also determine if inventory of the commodity is centralised or decentralised and if any inventory information is available. Based on this, determine how orders will be initiated.

From this analysis, the preferred solution is derived for each of the dimensions discussed and it should be combined with the prioritised commodity rating as discussed in Paragraph 7.5 to determine, first, the preferred e-procurement solution and secondly, which products to purchase using the solution.

## **7.7 Commodity Feasibility and Recommended e-Procurement Solution**

Based on the results of the previous two sections, the most feasible solution for each of the aspects should be derived. This will indicate the most preferred platform (Internet, Extranet, Intranet), the integration required (with ERP, legacy, etc.), the preferred data format (XML vs. EDI for instance) and the recommended e-procurement business model (buy-side, sell-side or marketplace).

Using the recommended e-procurement solution, information should be used to research current e-procurement offerings and determine which solution addresses the IT requirements best. Should no solution adequately fit the requirements, the possibility of developing a new system should also be considered.

## **8. FRAMEWORK COMPARISON**

### **8.1 Existing Frameworks**

Two frameworks assisting e-procurement implementation were encountered during research. The first is a proprietary model used by Sasol during their CommerceOne implementation (which was coined the Funnel Model) and the second a procurement transformation model developed by Accenture (Laub *et al.* [18]).

The Funnel Model had a similar approach to that of the proposed framework and had the following mechanics:

- *Prioritise commodity groups.* Similarly to the proposed framework, it prioritises commodity groups in terms of the savings potential through implementing e-procurement solution, as well as the IT integration required.
- *Rank business units.* Each of the business units is ranked in terms of their susceptibility to procurement using an e-procurement solution (taking cognisance of aspects such as business readiness, commodities procured and current IT infrastructure).
- *Formulate roll-out strategy.* Using the commodity group profiles and the business unit sequence, a roll-out strategy is formulated. The commodity group sequence is plotted against the business unit sequence and a high-level project plan is formulated.
- *Supplier take-on.* For the selected commodity groups, the suppliers are ranked taking cognisance of price and quality, quality of business processes, catalogue quality and the length of relationship with the buying company.

Although Sasol encountered more stumble blocks than initially expected, they have successfully implemented the CommerceOne BuySite™ solution at three sites in the Sasol group. Without the existence of some structure in strategising product, IT and supplier adoption, the process would definitively not have realised the significant savings experienced to date. Sasol will also use the model to prioritise further rollouts of the CommerceOne e-procurement solution within the group.

The Accenture procurement transformation model, as discussed by Laub *et al.* [18], is a high-level model that aims to ensure that the structures in place also support the transformation necessary for an e-procurement purchasing approach. The model suggests that companies should start off by first ensuring that highly skilled buyers with excellent category knowledge should drive procurement and use the e-procurement system to deploy and enhance the experts' expertise. The model suggests a thorough analysis of each of the commodity groups and identifying possible cost-saving areas. The model also suggests establishing best-of-breed sourcing strategies and through the savings realised, develop capabilities such as the implementation of a new system.

## **8.2 Comparison of the Proposed and Existing Frameworks**

Although the proposed framework has similarities to the Funnel Model used by Sasol, the Funnel Model is primarily an implementation tool whereas the framework developed in this research is an evaluation tool.

Unlike the Funnel Model, the developed framework does not initiate with a set solution, but rather analyses a company's total procurement (focusing on aspects such as products, processes and existing systems) to determine the susceptibility to e-procurement. Criteria developed also assist in recommending the required integration as well as data format and information architecture. The proposed framework establishes the most important criteria to

evaluate e-procurement solutions. Should no “off-the-shelf” solution adequately fit the set criteria, a new solution can be based on the specifications set out by the framework.

The choice of solution, as well as outputs from the proposed model, can be used as input to the Funnel Model (removing the first product rating stage). This will enable the formulation of a roll-out plan for the solution. The proposed framework therefore does not aim to replace the existing Funnel Model, rather it aims to complement it and function as an extension in choosing and rolling out the most feasible e-procurement solution.

The procurement transformation model is not an implementation or evaluation model, but rather aims to ensure that procurement is business rather than system driven. With the model, however, it is possible to derive a number of different systems for each of the different commodities procured within a company. Although the proposed framework may set out with an e-procurement system in thought, it ranks each of the commodity groups and will only implement the system for the chosen groups with savings potential.

## 9. CONCLUSION

e-Procurement solutions present significant potential through a number of tangible and intangible benefits and will also help drive on-line supply chain collaboration processes between companies. A number of implementations have not achieved the promised results as they considered e-procurement from a solution rather than a business and strategy point of view. Before the e-procurement solution decision, companies should have a sourcing strategy for each of the commodity groups they procure. The proposed framework will then assist in aligning the susceptible commodity groups with a potential e-procurement solution and will also assist in choosing the most suitable solution. An e-procurement solution should be viewed as a catalyst to control and improve efficiencies of a category of a company’s purchases.

South Africa, however, has a number of unique problems facing the implementation of a first-world solution such as e-procurement. Aspects such as a limited and monopolised supply base, limited bandwidth and BEE & SMME policies all complicate the feasibility and achievability of savings and improvements generally accepted with the implementation of such a solution. Companies opting for an e-procurement solution should therefore consider a staggered-process automation approach. Starting with the implementation of procurement cards (P-Cards) or on-line auctions for some of the commodities could be first steps before a full-fledged e-procurement rollout.

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