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E-Procurement – Process Based Conceptual Model

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Abstract: This paper aims to contribute to the development of a process based conceptual model of electronic procurement. Model is based on three basic e-procurement processes – strategic, tactical and operational e-procurement. Processes are divided into phases which are supported by applications (i.e. software programmes). Apart from applications supporting basic procurement activities there is a currently fast growing group of ADM (Analytical - Decision support - Management) applications, which brings business benefits especially in complex procurement environments. The basic view is that of ICT's (Information and Communication Technologies - namely Internet, Internet technologies, Internet standards, Internet applications) support of procurement activities. Paper presents integrated e-procurement applications and also various integration requirements of e-procurement applications. Model may perhaps help enterprises, which are new to e-procurement, e.g. SMEs, to gain basic understanding of which applications may be used for implementation of e-procurement processes.

Keywords: e-procurement, e-auction, e-tendering.

I. Introduction

Procurement refers to the processes used by buying party in locating, purchasing and moving materials from suppliers to the buyer's point of need [19]

Procurement (of direct materials) is also an important part of SCM (Supply Chain Management). SCOR (Supply Chain Operation Reference) model, i.e. system of process definitions for SCM, consists of four elementary process types – plan, source (i.e. procurement), make, deliver [20], [7].

Procurement concerns two types of materials

- direct (production) materials i.e. raw materials, components, production-oriented services, products, which become parts of finished product/service or are further sold to company's customers
- indirect (non-production) materials i.e. materials which are not part of product/service, which is produced and sold by the company. Typically MRO (Maintenance

Repair and Operating) supplies – laboratory equipment for research, computer HW and SW, leased cars, office equipment, food for catering, cleaning - and non-production services

Both material types have different characteristics, as seen from table 1 (modified [6], [10]). These characteristics influence the e-procurement (EP) solutions for direct and indirect materials.

Several definitions of e-procurement (EP) have been presented e.g. [16], [18]. Our definition is the following:

E-procurement is implementation of procurement functionality for direct as well as for indirect materials/services using application software (applications). In modern e-procurement, which is subject of our paper, Internet, Internet-related standards, Internet (web) applications or services are used.

As in many other application areas, also in e-procurement ICT are used for electronic processing (as opposed to manual processing), process automation, as stimulator of process modifications, means of communication, information sharing and coordination among all participants as well as for internal as well as for external integration [19].

Implementation of e-procurement is influenced by many factors and developments in ICT/IS area. The basic ones are the following

- use of Internet (for business support) – global communication network, environment for internet-applications
- applications architecture – from monolithic via client/server to Web-enabled client/server to SOA (Service Oriented Architecture)
- ERP developments – in functionality, internal architecture, integration means, means of user communication with ERP
- e-marketplaces developments – functionality, ownership [8], [12]
- integration solutions – namely data and application integration, inter and intra-enterprise integration, modern integration technologies SOA (Web service) oriented [9].

II. Process-Based E-Procurement Conceptual Model

II.1 Introduction

There is a large body of literature describing in various extent e-procurement processes, mostly tactical and operational EP. Various references use different phases of processes, different terminology and different “width” of description – processes are typically used as basis for analysis of different EP attributes. Boer [5], whose main aim is to assess the impact of e-procurement, presents six “forms” of e-procurement. Knudsen [11] presents process descriptions based on seven steps of business procurement life cycle by Archer and Yuan [3], as well as on e-procurement applications based on Boer’s “forms”. Davilla [4] presents e-procurement “models”, which are basically the e-procurement technologies in our view and discusses also barriers to their utilization. Both Turban [21] and Puschmann and Alt [17] present a short view of e-procurement processes, as basis for their further analysis of other aspects of EP. Weele [22] presents comprehensive description of procurement processes, with different process phases than our EP model. Aberdeen Group [1], [2] has been for many years active in e-procurement research, analysis and methodologies. Based also on references mentioned above the aim of this paper is to contribute to the development of EP process based conceptual model.

Our process-oriented conceptual model (framework) of e-procurement is oriented at buyer-executed activities. From institutional point of view the buyer may be

- enterprise (business) – because of specifics from the EP point of view often SMEs and “non-SMEs”, i.e. larger enterprises, are distinguished
- public administration
- In this paper we take the enterprise’s point of view.

Two basic ways of procurement (buying), from buyer’s perspective are

- contract – based (systematic) buying, based on long-period contract – which is the basis for partial deliveries (transactions) i.e. repeated execution of operational EP process. This way is subject of our paper
- spot buying without a priori contract. Includes one delivery (transaction) i.e. only one execution of operational EP process. With ICT support this way may be implemented
 - in case of fixed prices by e-catalogues located at supplier site or at 3rd party sell-side vertical procurement portal
 - in case of variable prices by direct Internet auctions at B2B auction sites or B2C auction sites (for some indirect materials)

Presented conceptual model, see fig 1, consists of three hierarchical levels of e-procurement processes. Process position in the hierarchy is determined by the strategic importance of activities implemented in the process. The processes are the following

- strategic EP process
- tactical EP process

- operational EP process

Dotted lines in fig.1 depict conceptual business strategic impact.

All EP processes are supported by ICT, especially by Internet, internet applications and internet technologies. Processes are divided into phases, which are further divided into steps. Functionality of individual steps is implemented by applications, i.e. software products/programmes) in relation to organizational, personal and other aspects. The application may concern, i.e. to implement processes of, several steps and also more applications may concern, i.e. to implement processes of, only one step of EP. Most EP applications are web-based client/server applications with light client i.e. web browser. At strategic and tactical level the ICT-supported processes, presented in this paper, are not considered to be substitutes for other (i.e. non ICT) activities as personal dealings, use of traditional information sources etc, but rather as enhancement of EP activities.

Strategic EP process is sub-divided into following phases

S1 – EP strategy formulation

S2 – EP strategy update

Tactical EP process is sub-divided into following phases

T1 - Requirement specification

T2 - Determination of the way of requirement solution

T3 - Suppliers identification and selection

T4 - Contracting

Operational EP process is sub-divided into following phases

O1 – Ordering

O2 – Delivery acceptance and payment

Operational EP process is executed for every partial delivery (transaction), in the scope of valid contract negotiated between buyer and seller in tactical EP process (i.e. systematic buying) or is executed only once for spot buying.

Typical EP scenario, i.e. systematic buying, which is considered to be typical for EP, is the following: in tactical EP process contract for given material with (the most convenient) supplier is signed. By repeated purchases (i.e. repeated instances of operational EP process), the partial purchases (transactions) are realized – in scope of signed contract.

Tactical and operational EP processes are event-initiated (apart from typical events given below there may be a big scope of specific events)

- tactical EP process – initiated typically by determination, at enterprise level, of long-term need for material, for which there is no supplier selected and no contract signed
- operational EP process – initiated typically by determination of immediate need for material, for which there is contract signed with selected supplier, i.e. partial deliveries in the scope of this (long-term) contract
Initiating event may be

- employee (end-user) needs material, typically indirect material e.g. MRO – mobile phone, and requires it by DPS (Desktop Procurement System) [15]
- need of direct material is determined by production planning application, which is a part of ERP system (i.e. MRP Material Resource Planning) or by SCM (Supply Chain Management) application. Operational EP process is initialized, which may be (in the case of direct material) executed by (preferably web-enabled) ERP applications or by SCM application

Our conceptual model does not include some phases, included by other sources i.e. quality control [21] or product consumption, maintenance and disposal [3].

Several steps of tactical and operational EP include means for EP coordination and collaboration, typically based on message transfer and (in some cases) on mutual access to information (databases). Coordination [19] involves the sharing and exchange of relevant information both internally as well as externally i.e. between enterprise and its business partners. Issues of coordination and collaboration are not detailed in our model.

Unified terminology in procurement and especially in e-procurement area is far away at the moment with various subjects, i.e. consultants, analytical corporations, users, solution providers, using different synonyms. „Tactical EP process“ is often called „sourcing process“ or „e-sourcing“, „operational EP process“ is often called „purchasing process“ or „e-procurement“. „E-sourcing“ sometimes include only the phase of selecting potential suppliers

Integration is an important issue of EP. Application integration is mostly used as well as data integration (typically for analytics, see 2.5.). In EP there are various ways of application integration, namely

- EP applications with inter-enterprise applications related closely to procurement processes (i.e. with some ERP applications and other inter-enterprise applications)
- (between) Individual EP applications, creating “integrated EP applications”
- EP applications (or users) with external applications, as with
 - Applications/IS of suppliers
 - Applications of intermediaries, which implement some steps of EP processes e.g. e-marketplace
 - Applications of ASP, which implement one or more phases of EP processes as service

For given EP implementation the degree of integration, measured basically by number and also by business scope of integrated application, may be

- null, i.e. only isolated EP applications is used, e.g. real-time Internet auction
- significant, i.e. several EP applications are integrated into “integrated EP application”. Typical examples
 - DPS (Desktop Purchasing System) application -

integrating basically all functionality of operational EP for indirect materials,

- e-RFx-based application – integrating e-tendering (including RFX creation), e-auctions (typically Internet online reverse auction) including supplier selection, which is one of modern EP integrated applications

SRM (Supplier Relationship Management) application – integrating most of inter-enterprise functionality for tactical and operational EP.

II. 2 Strategic EP Process

This process, oriented towards formulation, control and modifications of EP strategy, consists of two phases

S1. EP strategy formulation

Result from this phase is EP strategy, which is a part of enterprise’s procurement strategy. It is based on enterprise’s current level of procurement and on current level of ICT use. Based on enterprise’s procurement strategy and with the aim to support enterprise business goals, EP strategy specifies especially

- which EP processes/applications are used, e.g. to support procurement of various materials (or groups of materials)
- strategic criteria used in EP processes e.g. criteria for supplier selection
- ICT participation in analytical, decision supporting and corresponding management activities
- which EP applications are hosted by enterprise and which are hosted by 3rd party (i.e. outsourced)

S2. EP strategy update (modification).

Is process of EP strategy modification, executed according to significant changes in business or IT environment as well as according to EP results so far.

II. 3 Tactical EP Process

In this process applications executing procurement functionality as well as AMD applications (see 2.5) and supporting services are used. AMD applications’ functionality goes well beyond automated tactical procurement and brings additional benefits. Process phases and their steps are the following

T1 - Requirement specification

Result from this phase is specification of requirement, typically log-term, for given product. This specification includes [22]

- functional a detailed technical specification
- quality specification
- logistic specification (e.g. delivery period)
- delivery volume (e.g. in pieces), target budget
- some other specifications, depending on industry

For direct materials this specification is included in product specification, based on BOM (Bill Of Materials), for indirect materials is set up by procurement officer.

T2 - Determination of the way of requirement solution

In this phase the tactical solution, which is in accord with EP strategy, is selected for fulfilment of requirement specified in phase T1. Two points of view are taken into consideration

- business – i.e. which benefit is expected (e.g. lower cost, short delivery period), way of delivery solution – spot buying, long-term contract, expected length of contract, specific criteria for supplier selection (e.g. if strategic supplier is being selected), whether one of current suppliers or new supplier should be selected etc.
- technological (ICT) – which ICT means (applications, their integration, communication environment etc.) in which EP processes will be used for requirement fulfilment.

T3 – Suppliers identification and selection

Result from this phase is selection of one (i.e. most favourable) supplier for fulfilment of the requirement. Contract with this supplier is signed in the following phase T4. Steps in this phase are not executed sequentially; particular steps are selected by buyer.

In this phase electronic request for information (RFI), request for proposal (RFP) and request for quote (RFQ) – commonly called e-RFx, as well as online reverse auctions and other applications, e.g. AMD applications as advanced bid analytics, are often used. RFP and online reverse auctions represent widespread online negotiation methods.

This phase is divided into two sub-phases

- suppliers identification – is the process of identification of potential suppliers (for given material or group of materials),
- supplier selection - is the process of evaluation of potential suppliers according to buyer specified criteria/requirements and selection of (typically) one supplier. Under specific circumstances more suppliers may be used for given material. For simplicity reasons we don't consider this situation

Sub-phase: suppliers identification

Step: information gathering

Is the process of market research, used for identification of potential suppliers, based on information gathering mostly from external sources, in significant part using Internet technologies.

The following sources/applications are used

- web-sites of potential suppliers
- internet search engines, internet portals
- internet supplier catalogues – at internet portals, e-marketplaces, specialized internet suppliers catalogues
- 3rd party services (“sourcing services”), accessible by Internet - for recommendation of possible potential suppliers. 3rd party with significant supply category expertise and know-how of given vertical market (and possibly own thorough evaluation of potential suppliers)

may recommend potential suppliers for given category/material. In some cases the service may include also hosting and consulting of all remaining steps of phase T3, resulting in selection of one (final) supplier.

Step: contacting suppliers

Is the process of contacting suppliers in order to get more info needed for their basic evaluation. Buyer asks suppliers to fill standard electronic RFI (Request For Information- eRFI) sent by e-mail or published on buyer web-site, which is evaluated in the next step.

Step: suppliers review

Is the process of performing general evaluation of potential suppliers, based on available information, by buyer qualification criteria e.g. financial stability, references, manufacturing facilities, material characteristics etc. Suppliers references may be verified by contacting supplier's customers and product samples may be tested by buyer. Result of this step is a list of potential suppliers, used in the next sub-phase. Internet is used often as communication media and information source

The following sources/applications are used

- suppliers web-sites (annual reports etc.), internet news servers (news, analysis), vertical information/procurement portals
- 3rd party services, accessible by Internet - for verification of supplier credibility, economic strength etc, (e.g. Dunn&Bredstreet)

Sub-phase: supplier selection

Step: e-tendering

Is the process of supplier selection in case of dynamic prices. It is executed in the following steps

- buyer publishes on Internet his requirements for bid (offer) for material delivery from potential supplier in the form of standard electronic RFP (Request For Proposal) or RFQ (Request Of Quote). Often buyer reduces access to RFP/RFQ to pre-selected (in previous sub-phase) potential suppliers.
- Interested potential suppliers submit, till the given date, their electronic bids (offers) in structure specified by buyer by Internet (e.g. to buyer web-site or by e-mail)
- this step often includes also bids analysis, comparison and assessment. Bids are typically in electronic standard structure, may be in XML format. Therefore semi-automatic multi-criteria supplier selection may be implemented. Criteria specified in RFP, price in bid and other criteria are used. The result of this step is either selection of one supplier, which satisfies best the given criteria, or selection of several “good” suppliers, from which the best is selected in the next step e.g. online reverse auction.

Step: e-auctions

Is the process of supplier selection in case of dynamic prices by use of internet auctions. From EP point of view the internet auctions are classified according to two criteria

- (algorithm) mechanism of auction criteria determination
 - o direct auction – during auction process the auction criteria (typically price) is increased
 - o reverse auction – during auction process the auction criteria (typically price) is decreased
- length of time of auction execution
 - o “standard” auction – executed during several days or several weeks
 - o real-time (on-line) auction – executed during few hours. During this time period all potential suppliers participate in auction process (are on-line connected over Internet or react by e-mail). All participants are “pre-selected” (e.g. by e-tendering), so that they satisfy all buyer’s requirements.

Reverse real-time Internet-based auctions, which are often used in EP, may be classified

- by type of materials bought
 - o single material auctions
 - o multiple materials auctions
- by number of attributes included into auction evaluation
 - o single attribute auction (typically price)
 - o multi-attribute auction, including also other attributes than price

As the (final) supplier, the one who satisfies best given criteria is selected.

Internet auction may be implemented on

- buyer web-site
- e-marketplace, supporting this functionality
- 3rd party web-site, supporting e-auctions. For spot buying typically direct auction at B2B auction sites, or (for SMEs also) at B2C auction sites
- 3rd party web-site, which is used only for real-time auctions, typically reverse auctions for systematic buying

Step: e-aggregation

Is the process of supplier selection based on aggregation of (partial) demands of various buyers into aggregated demand, which is then published (on Internet) for potential suppliers as electronic RFP, RFQ. By demand aggregation typically the lower price can be reached. This process is used only to limited extend, mostly for commodities.

E-aggregation is implemented on

- e-marketplace, supporting this functionality, typically consortia e-marketplace. There is a limited number of e-marketplaces supporting aggregation.
- 3rd party web-site, with specialisation at aggregation

Step: e-negotiation

Is the process of buyer negotiation with potential suppliers with the aim to reach the agreement on the contract between buyer and supplier under complicated conditions, when above mentioned approaches (i.e. e-auctions, e-tendering), which often include supplier’s a priori agreement with important contract conditions proposed by buyer, cannot be used.

Process is based on Internet use as communication media and often on use of DSS applications for support of negotiation management and evaluation of results. These applications are relatively new, used in limited extent.

Final signing of contract is not part of this step.

T4 – Contracting

The result of this phase is contract signed by two parties – buyer and supplier, which is also a basis of partial demands/deliveries (transactions) executed in operational EP process.

This phase is supported by CMS (Contract Management System) application (see section 2.5.) and typically by buyer specific ADM applications, often Excel-based.

II. 4 Operational EP Process

This process is started by recognition of immediate need for material for which (typically) contract was already signed (i.e. systematic buying). Process consists of two phases which are executed sequentially.

Applications supporting both phases of operational EP are typically integrated into one integrated application, supporting whole process of operational EP. Basic differences between procurement and operational processes for direct and indirect materials appear in table 1.

	Direct materials	Indirect materials
Order size	Large lots	Often small
Percentage of total spend (typical)	80%	20%
Percentage of total numbers of purchase orders (typical)	20%	80%
Scheduled by	Production runs	Not scheduled, ad hoc
Locus of operation	Professional buyer’s desktop	employee desktop
Driven by	Design specification	Catalog-employee selection
Approval	Not required	Required
Degree of automation	High	Low (often no automation)

Table 1: Procurement of direct versus non direct materials.

On these differences the differences between integrated applications for direct and indirect materials are based. Integrated application for indirect materials provides functionality, i.e. requirement generation by end-user, material selection from catalogue, requirement approval, which is not required for direct materials. This is the main reason for separated solutions (applications) of operational EP for direct materials and operational EP for indirect materials

- operational EP for indirect materials – provided by integrated application DPS
- operational EP for direct materials – provided by integrated application Web-ERP (i.e. ERP with web-browser interface) including integrated ERP applications e.g. MRP for operational procurement planning, eventually with integration of SCM application (especially for strategic and tactical EP planning)

Operational EP process for indirect materials is described below.

O1 – e-ordering

This phase is divided into two steps

Step: requisition creation

Requisitions for direct materials are typically automatically generated by MRP or APS application, including order generation and it's sending to supplier by agreed upon communication channel (Internet, EDI etc.)

Requisitions for indirect materials are generated by end-user (employee) using multi-supplier e-catalogue for materials selection, by means of web-browser. Only materials already contracted with all suppliers are listed in catalogue. The result of this step is electronic requisition for material, which is automatically passed to next step.

The catalogue should always contain complete and actual information. Therefore its content management and its location are of importance.

Buyer may use the following catalogue organization and location

- integrated multi-supplier catalogue, located at buyer IS (web-site)
- integrated multi-supplier catalogue, created and maintained in 3rd party system (e.g. e-marketplace), i.e. outsourcing from buyer's point of view
- partial catalogues located in systems (sell-side web-applications) of individual suppliers and accessible by Internet

Step: requisition approval, order generation, sending an order to supplier

Electronic requisition, created in previous step, is automatically passed to proper managers for approval. By definition of requisition rules (and financial limits for employees) the number of approval steps can be limited or excluded at all. These activities are executed by (application)

workflow management system. Standard purchase order is automatically created from requisition, including integration with corresponding ERP applications (e.g. purchasing, accounts payable). The result of this step is electronic purchase order, sent to supplier by some communication/integration technology as e-mail, fax, EDI, XML message.

O2 – Delivery acceptance and payment

This phase is divided into three steps

Step: delivery monitoring (by buyer)

By use of ICT buyer can monitor the state of delivery i.e. if it is being completed, if it has been expedited already etc. Immediate state of delivery can be monitored at supplier web-site or at logistic firm's web-site in case the logistic operations has been outsourced by supplier.

Step: acceptance of delivery and of supplier's invoice

Material is delivered to buyer, who executes the corresponding activities in corresponding applications, typically in ERP applications e.g. accounting, inventory. Invoice is then sent to buyer. Supplier may use ICT for electronic invoicing (e-invoicing). Electronic invoicing is the transmission and storage of invoices by electronic means, without the delivery of paper documents. For electronic invoice integrity and authenticity have to be provided (e.g. by EDI, electronic signature). This step executes buyer's activities following invoice acceptance, provides comparison of invoice with accounts payable and approval of invoice discharge by automatic workflow. The result of this step, which is executed in significant degree automatically, is authored payment order.

Step: e-payment

Based on payment order the payment by electronic means, typically through a bank, is executed in this step. EDI, electronic banking is used. Other progressive means to limited extent. For increased process efficiency buyer's electronic self-billing can be used.

II. 5 EP ADM Applications

These ADM (Analysis-Decision support-Management) integrated applications enhance EP functionality (mentioned above) in one or in more steps of EP processes. Some applications, e.g. TCM, go far beyond the scope of procurement. In these applications analytical functionality is typically closely integrated with EP decision support and EP management functionality. Data are extracted from various, mainly internal procurement related (typically operational EP related) sources. Advanced analytical methods are used, known as well as "Business Intelligence" e.g. data mining, neural networks, as well as various optimisation methods, valuable especially in situations with multiple variables. Partial applications support above mentioned EP processes as well as new specific processes e.g. analytical processes.

These applications are offered under various names

(“labels”), accenting analytical or management functionality. It is in this area of EP applications where is the greatest pace of new developments at present. Forester’s forecast of worldwide revenues for EP related software [14] predicts bright future especially for spend analysis (management) and also for contract life-cycle management applications.

ADM applications are event-initiated and may be executed either periodically or on as need basis. They support execution of tactical and strategic e-procurement processes.

Typical ADM applications are the following

Bid analysis

Application is used for simultaneous negotiations and evaluation of complex bids. Optimisation may be used for solution of multiple variable problems within given constraints. Application is used typically in phase T3.

Contract Management System

This integrated application includes applications (tools) and processes for contract life cycle management – contract formulation, contract execution/use, contract termination. Analytics applications – analysis of supplier performance, analysis of contract compliance (which is an important instrument for enterprise to fully implement savings negotiated in contract) – are often integrated into this application. Application of DMS (Document Management System) is used for creation and management of archive of all documents created during contract life-cycle. Data for contract compliance (by buyer) are extracted also from related applications e.g. ERP. Analysis of contract compliance by buyer is typically executed, while contract compliance by supplier is typically part of supplier analysis integrated application (see below). CMS is used in EP tactical process, typically for support of step T4.

Spend analysis (and management)

This integrated application is oriented towards

- extraction of procurement related data from various sources (ERP, EP applications)
- classification of this data, using various BI analytical methods, into typical categories - material category, division, supplier, employee
- automated data analysis from different perspectives related to various EP processes and supporting applications – tactical EP, contract compliance management, supplier management, EP strategy and procurement strategy. Use of this application provides measurable benefits in all these areas.

Basic aim of this application is to provide in-depth quantitative view of how the company spends procurement money, typically on global company basis.

Category spend analysis (and management)

This application is basically a subset of “Spend analysis”, oriented towards one product category.

Supplier performance analysis (and management)

Application is used for analysis of supplier performance against his contractual obligations, based on standardized metrics. Results as typically used for supplier management e.g. in negotiations with suppliers e.g. contract renovation and for possible modification of procurement and EP strategy in area of supplier selection.

Total cost management (TCM)

TCM is managerial approach, supported by applications, of managing TCO (Total Costs of Ownership) of all enterprise supply-related costs. In TCO all costs related to materials, supply infrastructure, supply –oriented process execution, supply performance exceptions are included. For purpose of TCO enterprise organization, processes, knowledge and technologies are aligned. For effective execution of TCM-related activities proper technology infrastructure (ICT supported) as well as central data repository, containing all related enterprise-wide data, is needed. From applications point of view TCM is an “umbrella” integrated application, using most of EP functional as well as ADM applications. Included in TCM are tactical EP, operational EP, as well as ADM applications spend analysis, contract management, supplier performance measurement [1].

III. Conclusion

Numerous benefits of e-procurement have been cited in [4], [5], [10], [11], [15], [16]. Although various reasons have been cited for using EP by buyer, the main reason is typically costs reduction. The reason being that costs reduction goes directly into bottom line. Wyld [23] reports that almost half of all American companies use e-procurement applications. 30% of companies surveyed use e-procurement for RFQ, 25% use on-line auctions, 33% use e-marketplaces. Most companies use only one EP application. Use of integrated EP applications or several isolated EP applications hosted by company itself has been mostly limited to large (often multinational) companies, where the benefits e.g. costs reduction in complex environment of many suppliers and many items purchased, are significant. However Forrester [13] reports growing interest in outsourced, i.e. 3rd party hosted, EP applications and services. Because of lower front-up costs, outsourcing of EP application may be viable alternative even for smaller companies.

As seen from previous sections, possibilities of ICT support of procurement activities are quite numerous and taking into account it’s benefits we may expect continuous adoption of EP in the future.

Perhaps the presented conceptual model may help companies in getting systematic view of EP and its possibilities, taken primarily from EP’s support by ICT point of view.

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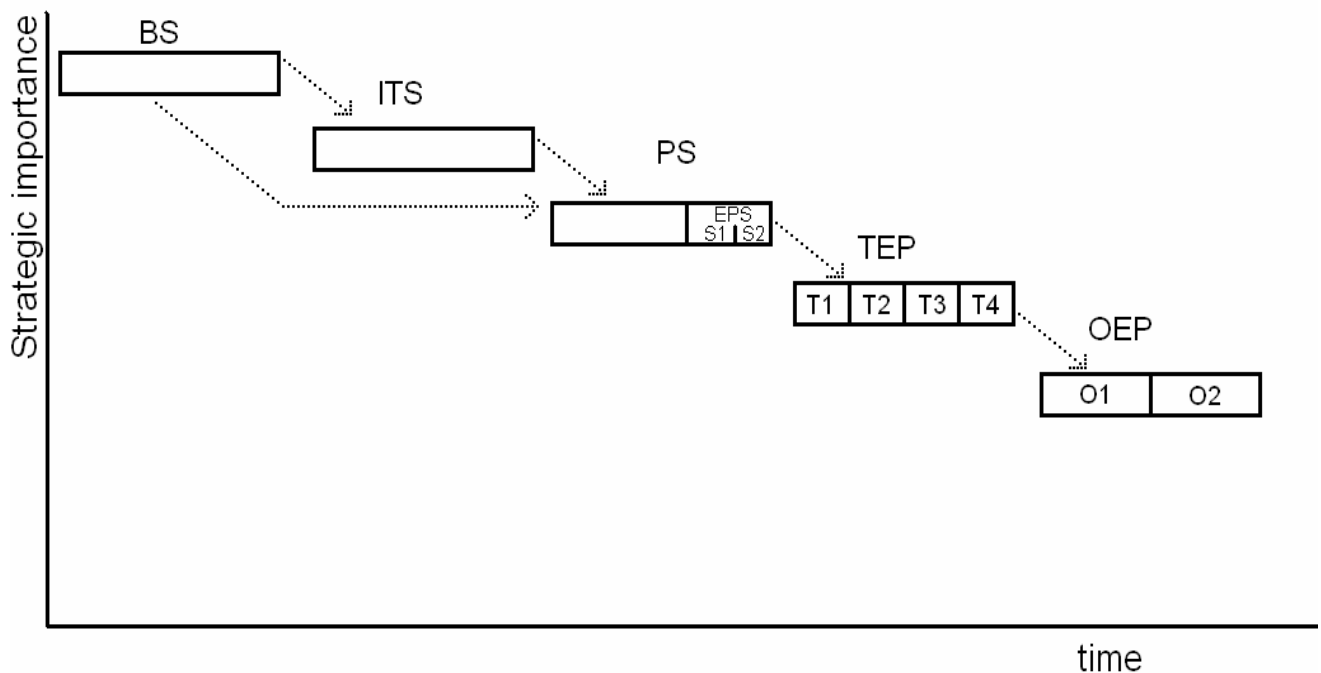


Fig 1.: E-procurement conceptual model

BS – Business strategy; ITS – IT Strategy; PS – Procurement Strategy; EP – EP Strategy; TEP- Tactical EP; OEP – Operational EP
 ...Basic business strategic impact