

Unraveling the complexity of the organizational adoption of electronic procurement: A direction for future research

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Abstract

This paper describes directions for future research to study the organizational adoption of electronic procurement (EP). An extensive exploratory study of EP adoption is taken as a starting point. In this study issues were identified that influence individual level adoption across different roles and phases in an organizational change process. An extension is proposed to this exploration of issues in order to develop insights in the way that management can effectively intervene in the organizational adoption process of EP. Specific topics that are addressed in this extension are the derivation of interventions from issues, dealing with roles, change phases, the link between individual and organizational level, different EP types and industries. Finally, some closing remarks are made.

Keywords: E-Procurement, Managing Technology Adoption, Interventions

1. Introduction

Since the introduction of internet technology in the purchasing function a wide proliferation has taken place of different E-Procurement (EP) tools. EP can be defined as an intra-organizational procurement process supported by network-based information systems. Only five years ago, EP only referred to e-ordering systems based on catalogs. Nowadays, the pallet of tools to support procurement has extended to a wider application domain, for instance e-tendering, e-auction, ERP integration, sourcing catalogs and collaborative tools.

The potential benefits of these EP tools are attractive to many companies, as they can contribute to the professionalization and development of the purchasing function by realizing procurement processes in a more efficient and effective way. Attracted by these potential advantages, many companies have made conceivable investments in EP, only to discover a varying degree of success.

Various recent studies have explored the benefits and applicability of EP tools in different situations (e.g. Harink, 2003; Hartmann, 2002). In addition, concepts (Boer 2002) and tools have been developed to identify the value of EP (e.g. iCARE, ePAT). Still, a major aspect of successful EP application has remained largely unexplored: in order to reap the

potential benefits of EP, adoption of an EP tool and the corresponding change of tasks and responsibilities, by all members of the intended user group, is crucial. This adoption is not self-evident. On the contrary, some people might demonstrate open resistance towards the change process; especially when their job is 'facilitated' in such a way that it has becomes obsolete.

Several aspects of adoption have already been researched quite extensively. For instance, in the social and psychological discipline, cognitive (innovation) adoption and behavioral mechanisms of individuals has received a great deal of attention. On an organizational level, research has primarily focused on different approaches towards change management and organizing the prerequisites for EP. Especially, the organization of technological issues, like standardization or infrastructure, have receive a great deal of attention. On the other hand, only very limited research focuses on the interplay between individual adoption and organizational adoption, although the importance of managing the adoption process is recognized by several academia (Hartmann 2002).

A first step in researching the complex situation of EP adoption has been made by the development of an E-Procurement Adoption Model (EPAM), in which issues are identified that influence individual level

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adoption for various roles and change phases. It provides an in-depth exploration of influencing factors based on both theory and practice, however, it only gives limited insight in the measures to influence the organizational adoption process. More formalized research is required to develop these insights and the EPAM provides a good starting point for this research.

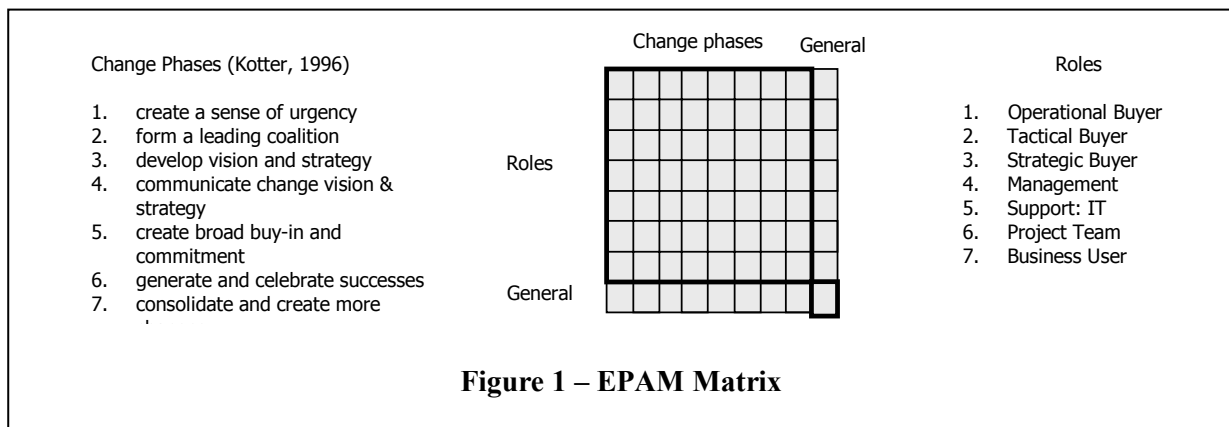
In this paper, a direction for future research is described building on the EPAM. First of all, an outline of the EPAM is given. Next, possible extensions to the EPAM are discussed in order to develop insights in the way that management can effectively intervene in the organizational adoption process of EP. Attention is given to the way interventions can be derived from issues, the link between individual and organizational level, dealing with roles, change phases, different EP types and industries. Finally, some closing remarks are made.

2. The E-Procurement Adoption Model (EPAM)

The EPAM is the result of an exploratory study to identify the issues influencing EP adoption. A straightforward framework was used in this research of 'issues' as independent variables and 'adoption' as a dependant variable. This adoption takes place on an individual level and is defined as the initiation of

behavior contributing towards organizational adoption. Naturally, more complex frameworks for researching individual adoption or behavioral mechanisms exist, however, these primarily focus on internal mechanisms. For instance, some researchers also propose intermediating variables for the effects of variables on adoption (e.g. Davis *et al.* 1989). The complex interaction and mediation of external variables provide the basis for a great deal of adoption research. For the exploration of external factors a simple internal framework is sufficient.

The following two dimensions were explicitly used in the exploratory study: a.) the organizational adoption process, and b.) the different roles. The organizational adoption process is viewed as a sequence of individual adoption processes. As a perspective of this organizational adoption process the change phases of Kotter (1996) are used. The interplay between individual and organizational adoption is dealt with by researching seven different roles. These dimensions were included in the exploratory study as means of structuring the empirical data finding process in a matrix with the eight change phases from Kotter (1996) horizontally and the seven roles that show individual adoption vertically. The matrix is referred to as the EPAM Matrix, as it provide the basis for the design of the EPAM. See Figure 1.



First of all, 'issues' were extracted from theory, clustered, and codified in a taxonomy. Then, method-triangulation of the following three empirical research methods was performed: expert interviews, case studies and focus group discussions (FGDs) to elicit

issues in practice. Confirmation of the issues from theory by the findings from the triangulation were searched for by narrative analysis and using the taxonomy as a coding scheme. A frequency analysis was conducted to find the occurrence and distribution

of major issues in general and specific for the different roles and change phases.

The EPAM is designed by a cluster analysis of the identified issues, yielding a revised taxonomy of issues based on theory and triangulation, and filling the EPAM matrix with this new taxonomy.

Theoretical exploration

A review of adoption literature shows the following important models that are widely used in the discussion about (IT) adoption: the Theory of Reasoned Action (TRA) (Fishbein & Ajzen 1975), the Theory of Planned Behavior (TPB) (Ajzen 1991), the Technology Acceptance Model (TAM) (Davis 1989), The Task-Technology Fit model (TTF) (Goodhue & Thompson 1995) and the Expectation-Confirmation Theory (ECT) (Oliver 1980). Of these approaches, the TAM is the most widely cited explaining model for individual adoption. Many follow-up studies have taken place researching TAM for specific information technologies and gathering further empirical evidence for the model (e.g. Davis *et al.* 1989; Adams *et al.*, 1992).

The models are predominantly designed to explain individual adoption of technologies in a B2C setting, corresponding with a limited change, and using mediating internal variables. Although a high level of explanation of individual adoption is attained in specific situations, limited research concentrates on classifying external issues. Therefore a taxonomy of issues is developed by reviewing both adoption and change management literature. Issues identified in the existing approaches adoption are included in this taxonomy. This resulted in a taxonomy of 84 issues in 18 categories and five super-categories. The taxonomy was codified to use as a coding scheme in the analysis of the data gathered in the triangulation.

Expert interviews

The first empirical method that was applied to develop the EPAM was semi-structured interviews focused on extracting issues based on expertise (knowledge and opinions) or experiences (actual events). During the interviews the focus was directed towards the latter in order to be as fact-based as possible. A *critical incident technique* was used to

focus on actual experiences with both positive and negative influence on adoption. Open questions about why and lessons-learned revealed more issues. Nearly all interviewees have drawn from more than one adoption experience; although some interviews dealt with one specific EP case. The EPAM matrix was used as a guideline and structure for the interviews by discussing the individual adoption of the roles during the organizational adoption of EP.

The selection of interviewees covered a broad array of different experts: consultants with relevant experience in supporting EP implementation, suppliers that have developed, sold, and/or implemented EP solutions, and scientists who have conducted research related to EP. For both consultants and suppliers the selection was based on including the opinions of major players in The Netherlands. The scientists were identified by their affiliation with NEVI, the Dutch Purchasing Management Association.

A total of twelve different people were interviewed, either face-to-face or by telephone and the emphasis was different in every interview due to the specific expertise of the interviewee. A total of 382 issues were extracted from the twelve interviewees.

Case studies

The next method to elicit issues from practice and develop the EPAM was the use of case studies. Yin (1994) states the following three conditions to assess the applicability of case studies as research strategy: the type of research question, the control of the investigator over the actual behavioral events, and the focus on contemporary phenomena. In general, case studies are recommended when 'how' or 'why' questions are being posed, when the investigator has little control, and when the focus is a contemporary phenomenon in a real-life context. The study of adoption of EP adheres to all of these criteria.

In the definition of a case study Yin (1994) describes that it copes with situations with more variables of interest than data-points and that it relies on multiple sources of evidence. The following different data sources were used in the case research in this study: documentation, to speed up the comprehension of the case and provide background information; 'hands-on experience', to get the 'look &

feel' of the EP system, and interviews. The interviews were the primary data source for the case studies. A comparable method was applied as for the expert interviews, using the EPAM matrix as interview guideline and also adopting a critical incidence technique. The major difference between expert interviews and case-interviews is that the latter deals with real-life experiences of the interviewee.

The selection of cases was derived from the objective of developing cross industry and general EP insights. Therefore, the cases dealt with various industries and different types of EP. In addition, the interviewees in a case were selected to include as much diversity of functional background as possible. Although Yin (1994) suggests a process where each case leads to the selection of the next case, a more parallel approach was applied. A multiple case study replication design (Yin 1994) was used to perform eight case studies of EP adoption across five different companies in eight different industries. The cases cover the different types of EP and all cases deal with an organizational EP adoption case that has already taken place or is in such a stage that discussion can take place about past experiences. A total of 565 issues have been extracted from the cases.

Focus group discussions

The third method to identify issues was conducting several focus group discussions (FGD). These are guided, in-depth explorations in which six to twelve members of a target population discuss their feelings, beliefs and behaviors relative to a research topic. The discussion shows how people behave and why they behave as they do. In order to facilitate a free discussion, the group members should be able to relate towards each other, as to the moderator, and be familiar with the research topic. Sharing personal or demographic characteristics could help in this respect.

Five parallel FGDs were held during a conference. In these discussions a specific case of an EP adoption was dealt with in a group of approximately eight participants. A case representative explained the case during a short presentation and then the focus group members were asked to participate in the discussion as one of the roles in the project. The discussion was set up as a

'role play'. The moderator used the EPAM matrix to explore the issues of the different roles in the different change phases in the case at hand. The FGD method and the EPAM matrix were discussed at forehand with both the case representatives and the moderators to ensure a proper usage of the EPAM matrix as discussion format.

The participants of the conference were predominantly purchasing managers of large Dutch purchasing organizations, in addition to several consultants and scientists. The participants were all familiar with purchasing and EP from a management perspective and were able to engage in an open discussion. The group composition and roles of the participants, initial background information about the discussion format, and a brief theoretical basis were provided at forehand.

The moderator has an important role in stimulating the discussion. The moderator should be comfortable in the group, familiar with the background, and able to structure the discussion. This was attained by having every group chaired by a NEVI-purchasing professor. The findings of the FGD were recorded and the moderator checked the minutes afterwards. A total of 422 issues were extracted from the FGDs.

Data analysis & design of the EPAM

The method employed for data analysis was a '*narrative analysis using a coding scheme*'. Data point from the findings of the expert interviews, case studies, and focus group discussions were placed in the EPAM Matrix. The data point can be seen as 'narrations' from the research participants. Then, all data points are categorized according to the taxonomy of issues found in theory, which is used as a coding scheme.

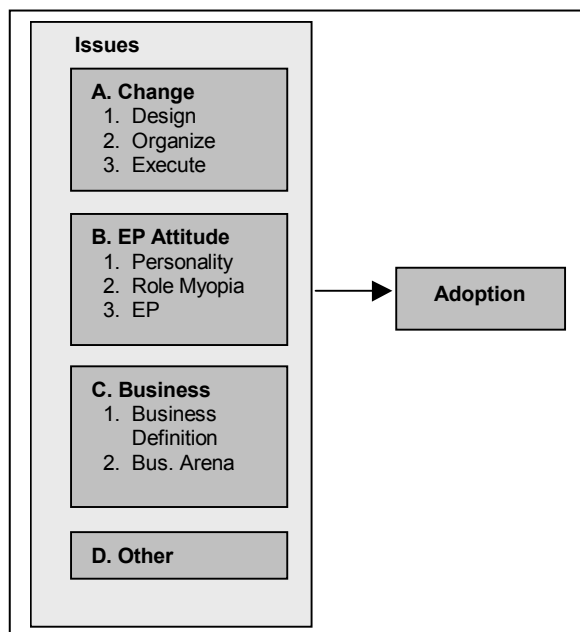
The following data analysis process has been performed for every one of the three triangulation data sources. Data points (narrations) are extracted from the interview, case and focus group discussion reports that broadly represent one discrete issue influencing individual adoption. The points are placed in the EPAM matrix, primarily based on were the respondents in the interview, case, and FGDs placed the points, and revised by the researcher according to the theory of Kotter (1996). Then, they were given a

code. The coding scheme includes super categories, categories and subcategories and a data point is ascribed to the 'smallest' possible category. The result is a filled EPAM matrix with codified issues. The data analysis has been performed for the total of 1396 data points.

A detailed analysis of the frequency of occurrence of the various types of issues and the distribution of issues across the roles and change phases in the EPAM matrix is made in Reunis (2003).

The EPAM builds on these findings and consists of the following parts: a revised taxonomy of issue and the filled EPAM matrix. A cluster analysis is performed to develop a revised taxonomy of issues based on theory and practice. The results of the frequency analysis are used to make a new taxonomy that is more concise and divides the frequencies more evenly across the different categories. Only the issues in the original theoretical taxonomy are included that are confirmed in all three empirical data sources and have a minimum frequency of over 0,5%.

Figure 2: Revised framework



This group of issues from the taxonomy, makes up approximately half of the total amount, while corresponding with a total confirmation frequency of

over 90%. This leads to a revised taxonomy of issues from theory with eight categories and three super-categories. Relating this back to the original research framework, this yields a revised framework as shown in Figure 2.

The EPAM matrix filled with the findings from the three empirical methods is converted to the new taxonomy based on theory and triangulation as shown in Figure 2. This provides a more practical overview of the categories of issues in general and specific to roles, change phases, and their combination. The frequency distribution across the EPAM matrix is shown as different shades of grey. See Figure 3.

Managerial implications of EPAM

Practitioners can use the EPAM as a management tool to facilitate the adoption process of EP. The EPAM matrix shows the possible issues that can influence individual adoption. If practitioners would like to influence the intra-organizational adoption processes, the EPAM matrix provides a guideline as to when (in which change phase) and where (with which roles) potential issues occur that influence the adoption. Only when these are known, effective measures or directed efforts can be designed and executed to intervene in these influences. Practitioner that are in charge or responsible for an EP adoption process are recommended to use the EPAM to identify the relevant issues in this specific process. Instead of employing random methods to manage the adoption, they should develop methods that effectively address the specific issues at hand. The focus of their interventions or actions can then be increased.

Even with the increased focus of where and when potential issues might occur the key towards managing the organizational adoption is not revealed. The question 'how' is yet to be answered. In order to achieve this, more in-depth research is needed to further unravel the complexity of organizational adoption of EP. Therefore, an extension of the EPAM research is explored in the next paragraph.

	<i>Sense of Urgency</i>	<i>Leading Coalition</i>	<i>Vision and Strategy</i>	<i>Communicate Vision</i>	<i>Create Buy-in</i>	<i>Celebrate Success</i>	<i>Consolidate and create more change</i>	<i>Anchor Change</i>	<i>General</i>
<i>Operational Purchaser</i>				A1, A2, A3, B1, B2, B3	A1, A2, A3, B1, B2, B3	A3, B1, B2, B3	A2, A3, B1, B2,		B1, B2
<i>Tactical Purchaser</i>			B2	A2, A3, B1, B2, B3	A2, B1, B2, B3	B2	A3, B2, B3		A2, B1, B2
<i>Strategic Purchaser</i>	B2	A1, B3	A1, A2, B1, B2, B3	A3	A3	B2, B3	B2	A3, C1	A1, A2, B1, B2
<i>Management</i>	A2, B2, C1	B1, C1	A1, A3, B1, B2, C1	A1, A2	A2, B2, B3, C1	B2	C1	C1	A1, A2, A3, B1, B2
<i>Support: IT</i>			A1, A2, C1	C1	A3, B1, B2, C1	B1, C1			A2, B1, B2, C1
<i>Project Team</i>			A2, A3, B1	A2, A3, B1, B2	A1, A2, A3, B2, C1		A1, A2, A3	A1, A3, C1	A1, A2, A3, B1, B2, B3
<i>Business User</i>	B2	B2	A2, B1	A2, A3, B1, B2, B3	A1, A2, A3, B1, B2, B3	A2, A3, B1, B2, B3	A2, B1, B2	A2, B2	A2, A3, B1, B2, B3
<i>General</i>	A1, A2, A3, B3, C2	A1, A2, A3, B1	A1, A2, A3, B3, C1, C2	A1, A2, A3, B1, B2, B3	A1, A2, A3, B1, B2, B3, C1	A1, A2, A3, B1, B2, B3, C1, C2	A1, A2, A3, B1, B2, B3, C1	A2, A3, B2, C2	A1, A2, A3, B1, B2, B3, C1, C2

Shade	Frequency in the Matrix	Frequency in the Roles	Frequency in the Change Phases
	> 10%	> 25%	> 20%
	5 – 9,9%	10 – 24,9 %	15 – 19,9%
	2,5 – 4,9 %	9 – 9,9%	10 – 14,9%
	0,5 – 2,4%	<9%	<10%
	< 0,5%		

Figure 3 –E-Procurement Adoption Model (EPAM)

3. Extending the EPAM: A direction for future research

The EPAM is a good starting point for future research as it provides the basis for developing managerial action to intervene in the organizational adoption process. The issues identified in this research are treated as independent variables; however, a complex interaction of these variables and mediating or moderating variables might approach reality in a better way and provide a better predictive model. For the basis of developing interventions this additional insight might be beneficial, but hardly

necessary. The step from identifying toward managing the issues can be made directly on the basis of an inventory study, which makes a direct effort to address the more essential managerial question of ‘how’ to manage organizational EP adoption, instead of ‘what’ influences individual adoption.

In using the EPAM as a research foundation some aspects of reliability or internal validity have to be kept in mind. For instance, the data gathering process may lead to some specific points of concern. The major issues were identified and clustered by the frequency of their occurrence. However, this does not

imply exhaustiveness and only gives an indication of the importance of the issue in explaining adoption. In addition, using a critical incident technique might leave obvious point or prerequisites unmentioned. For instance, having a computer was never mentioned, but is surely required to engage in EP. Besides points referring to the data gathering and analysis, a lot of discussion takes place among scholars about triangulation as a research method. Especially, the comparability is a major issue. In the EPAM research, this is addressed by using a coding scheme for data analysis. The basis for interpretation and converging results remains. Methods to resolve the reliability issues include hypothesis testing using the revised research framework or conducting a replication study to refine and further develop the EPAM. These will not be further pursued in this research.

In this paragraph, an extension to the EPAM research is explored with the objective of identifying ways in which management can effectively intervene in the organizational adoption process of EP. First of all, attention is given to the way interventions can be derived from issues. Next, some construct and external validity points are taken as a basis for extension. Construct points includes the various roles, change phases, and the link between individual and organizational level. Finally, the applicability of EPAM in specific situations is dealt with for the different types of EP tools and different industries.

From issues to interventions

The transition from issues to interventions is not always straightforward. First of all, knowledge of the relevant issues in a certain situation is required to be able to develop an effective portfolio of interventions. As mentioned above, the EPAM can be used as a general guideline, with some caution concerning the exhaustiveness and importance. Straightforward relations between issues and interventions exist when they refer to the same concept, like various aspects of communication. For example an issue of personalized communication, which is an aspect of change execution in Figure 2, has the same intervention. However, more specific complex relations between one or more issues and one or more interventions also exist. For instance, issues referring to

organizational structure or culture can be influenced in various ways and have a complex interdependence.

Developing a set of suitable management interventions and planning their application over time and towards various people in the organization can become a very complex question. Even when the set of issues determining the individual level adoption is fully understood, the following points need to be taken into consideration:

- the importance of the various issues has to be determined, as well as
- the ease of addressing the various issue and
- the effectiveness of the interventions on the various issues.

The importance of the various issues shows how much a certain factor contributes to the adoption on an individual level. The frequency of occurrence in the EPAM can provide an indication of importance, however, a distinction has to be made between factors leading to a stimulus of adoption or merely function as a dissatisfier. There is a difference between motivating issues, like appraisal systems, and dissatisfying issues, like the availability of technical support. Issues that are in the latter category include a set of prerequisites, e.g. access to the Internet, that always have to be in place, before people are even able to adopt a new behavior and system. On the other hand, some issues that are clearly motivators or that only relate to a certain aspect of EP adoption, do not necessarily have to be fully in place. Individuals only evaluate a certain set of external factors (the bounded rationality) to form an attitude and consequently determine their behavioral intention. In this internal behavioral mechanism some dissatisfying issues can be crossed out against more important positive motivational issues. For instance, people might still change their behavior as the positive purchasing performance outweighs a less attractive interface of an EP tool. Motivational issues must not be confused with positive issues; a punitive system might just as well cause an individual level change. In addition, dissatisfiers can also be a result of faulty motivators, for instance an information overflow or too conceptual presentations. The issues in the EPAM are not divided in motivators and dissatisfiers.

The ease to address various issues can vary a great deal. Some issues, like the availability of a test environment or specific training, can be realized relatively easy. Others, like the administrative hierarchy in an organization, are more difficult or not economically viable to address. Some issues can hardly be addressed at all, like the macro-economical business environment. Both the managerial locus of control and an economic factor plays a role. The position with corresponding formal and informal sources of power and (financial) resources can greatly influence the scope in which managerial interventions can effectively be exercised. The degree of personal effort to convince others towards adoption behavior can also vary a great deal with the same scope, for instance, a persuasive phone call versus in-depth personal training.

The effectiveness of different interventions on one or more issues is not always clear. Even in straightforward intervention-issue relations, direct effects can be disturbed by indirect effects, for instance early end-user involvement leading addressing the issue of involvement, but also leading towards an increased apprehension and therefore hesitation in adoption. Furthermore, a time factor, closely related to the ease of the intervention, plays a role in the effectiveness. A delay of certain management interventions can cause the system dynamical problems with feedback loops, like an overshoot of actions. This is more likely when the delay is considerable. The effectiveness of interventions can be determined by using the end-measure of adoption in a stable end-situation, i.e. after the effectuation delay. This also makes it possible to view the complex interrelation between various interventions, various issues and the internal behavioral mechanisms as a black box.

Change phases

The eight phases from Kotter (1996) have a high face-value and are widely used in managerial practice, however, the use of these phases in both the EPAM data collection and analysis leads to some methodological concerns. Both in the case studies as in the FGDs, the change phases in the EPAM matrix (Kotter 1996) were not dealt with in consecutive order, but rather in a more parallel and iterative way.

In a real-life change situation several iterations of phases are likely to occur, especially when the overall project suffers from some setbacks. Another point of critique of using Kotter (1996) is that the exact transition between the phases is difficult to determine. The phases deal with relevant aspects of organizational change on a whole, but are difficult to separate. On the other hand, in the EPAM research, the research participants were all familiar with Kotter (1996). This facilitated the empirical data gathering process.

A large concentration of the empirical findings can be found in the phases of communication and creating buy-in. Besides the general issues across all the roles and all the change phases, these two phases contain the highest count of all remaining issues. These are the phases in which more people become involved in the organizational change and a group responsible for creating the organization change, e.g. a project team, puts in an effort to explain and convince a certain focus group of the change plans. These results in buy-in when people are persuaded to contribute to the projected organizational change and some initial results can be realized. In both phases a directed effort takes place, where a smaller group of people persuades another larger group to change their behavior and start using a new system and corresponding methods.

Both the drawbacks of Kotter's (1996) phases and the lopsided distribution of issues across these phases lead to the conclusion that in further research these should not play a prominent role. Instead, a focus on the way in which people or groups of people influence each other could provide a lead towards developing effective management interventions.

Roles

The roles that were included in the EPAM research are not exhaustive. More roles could have been included. The seven included in the EPAM, however, capture the most relevant types of individuals during a change process of implementing EP inside an organization. Other peripheral roles also influence the organizational adoption directly, when they have to provide some sort of effort, or indirectly, when they influence the adoption behavior one of the seven roles included in the EPAM. Within the

organization, various support functions, like the financial officer, human resources, accounting or – in a production environment - engineering and R&D, can play a part in organizational EP adoption. When the scope is extended across the borders of the organization, even more types of individuals can influence the EPAM roles. In particular, key suppliers and organizational stakeholders could exert some influence. The additional internal and external roles play a peripheral part in the organizational adoption by their social influences. The occurrence of the peripheral roles in the various issues identified in the EPAM is limited, although supplier related issues sometimes are occasionally noticeable. If the focus remains on internal roles, then the seven roles suffice for future research. Otherwise, the supplier should be added.

Using roles as a means of classifying different types of individuals in an organizational change reveals specific issues due to the perspectives that different roles have. Every role will view the change at hand in light of its job and responsibilities. This concurs with the findings from the cluster analysis, in which the cluster of 'role myopia' (see Figure 2) refer to issues that result from a specific role. Even though roles are a relatively good means of classifying issues, related concepts might have a higher discriminatory value when there is a strong sense of social pressure or equality. In the EPAM research, the social pressure and especially degree of equality within the various roles are based on similar tasks and responsibilities. In any group of individuals that have a close working relationship in terms of collaboration, shared responsibilities or functional similarity, the social pressure plays a more important part in the formation of individual attitudes and consequently behavior. The concept of Communities of Practice (CoP) also recognizes informal groups of people the have a strong converging attitude formation that are not official functions, teams or task forces. Individuals can be a part of different CoPs and an organization can be seen as a constellation of overlapping CoPs. Taking CoP as a research perspective makes it possible to include informal group behavior. If the use of CoPs provide a discriminatory value of the relevant issues, more focused interventions can be applied to address these issues.

In future research, additional roles can be added to create a more complete picture of organizational adoption. However, more interesting from a point of trying to develop interventions, is finding groups of individuals with a closer attitude formation. Using CoPs provides a promising perspective.

The interplay between individual and organizational adoption

There is an implicit assumption in researching a multitude of individual adoption that this is a good way to capture the complexity of organizational adoption. Whether the typology of individuals is based on roles or on CoPs is not relevant; the assumption remains the same. They both take an intermediate level of a group to bridge the gap between individual and organizational level.

A closer look at the issues for the different roles reveals that the majority of issues refers to a direct or indirect influence of other individuals. Individuals influence each other during the organizational adoption process and, in turn, their own actions are largely determined by the behavior of others. For instance, the project team has a lot of influence on the operational buyers through persuasive directed actions. The other way around also holds as the project team can motivation be influenced by the buy-in or lack of buy-in of the operational buyers.. Together with the conclusions drawn from the importance of issues in the communication and buy-in phase, further research should try to capture the dynamic process of the interaction of individuals as apposed to the static approach of clustering issues roles or CoPs.

The dynamic process of intra-organizational dissemination of adoption can be captured by using general concepts from Social Network Theory where actors and ties make up a network that represents the social structure of an organization. Actors can be chosen at an individual level or a group level, i.e. roles or CoPs. Ties are the connections between actors and consist of both medium and means of influences on each other. Naturally, these ties can be embedded in an existing organizational structure and can be formed over time. Within the research focused on the spread of behavior, information, or adoption in networks, a structural and dynamic perspective can

be identified. In the first perspective the network is a static set of actors and tie in which the dissemination or spread takes place. A large body of research deals with the influence of characteristics of the network, e.g. connectiveness, structural holes or embeddedness, to the spread or dissemination process. Also on an individual level many studies have explored the relation of the specific position of actors or individual characteristics to the spread. In a dynamic approach, networks can emerge and evolve along spread of adoption among individuals. Structuration and Adaptive Structuration Theories build on this notion. For several EP types existing ties are altered, while for other these remain the same. Therefore, both static and dynamic networks can provide a lead for researching interventions between actors to stimulate the spread of EP adoption.

Type of EP

The EPAM is designed as a general model applicable for all EP tools that correspond with a second order change. This means that cognitive or

experience schemes that determine the behavior of employees are changed because of altered processes, roles and structures. (Bartunek and Moch 1987). In a first order change the schemes remain the same. Several different types of EP tools cause a second order change when they are implemented, like e-ordering, collaborative product commerce, web-based ERP or e-auctions. Others can be accompanied with both a first or second order change. An overview of EP types based on Harink (2003) and their corresponding order, depth and scope of change is shown in Table 1.

The general approach of the EPAM implies some limitations for the usage. First of all, the EPAM is not applicable for EP-tools that only invoke or require a limited degree of change, like an e-tendering event. Secondly, the issues that apply for specific types of EP can be somewhat different, and, consequently the effectiveness of interventions may also differ. This sensitivity of the effectiveness of interventions and the occurrence of issues could also be the case for other specific situations, like different industries.

Table 1 – EP Types and Corresponding Change

EP Type	EP Category	Order	Depth	Scope
E-Ordering	E-Systems	Second	Technology, process, role, and individual	Business and Purchasing function
Coll. Product Commerce (CPC)	E-Systems	Second	Technology, process, role, and individual	Business and Purchasing function
Web-Based ERP	E-Systems	Second	Technology, process, role, and individual	Business and Purchasing function
E-Reverse Auction	E-Transaction	Second	Technology, process, (role, and individual)	Purchasing function and Business to a lesser extent
E-Intelligence	E-Informing	First or Second	Technology, process, (role, and individual)	Both business and purchasing function
E-Tendering	E-Transaction	First or Second	Technology, process, (role, and individual)	Mainly Purchasing function
E-Sourcing	E-Transaction	First or Second	Technology	Purchasing function
E-Contract Management	E-Informing	First or Second	Technology and process	Mainly Purchasing function

Organizational change efforts for the various types of EP are often combined. This is especially true when the technical functionalities are provided by a third or intermediary party and can be used internally on a service basis, i.e. when an internal

user wants to apply a specific tool for a certain purchasing situation. Examples of these integrated suites of EP tools are Supplier Relationship Management (SRM) tools and e-marketplaces. In addition, change projects are often initiated to

increase the usage level of one or more tools that are already in place instead of introducing a completely new tool. Modification or additions to a tool can be made, but the objective of this type of project is not the introduction of a new system, but increasing the value of the way in which IT supports the purchasing function.

The concept of EP Maturity could provide a more interesting perspective for studying interventions for organizational EP adoption. It takes the movement to a more value-added IT in the purchasing function as a starting point. This perspective recognizes the parallel introduction and usage of different EP tools and a movement from the first introduction with EP towards sophisticated IT support with a wide portfolio of EP tools, high degree of functional and system integration, large scope, domain and usage level. The system's complexity and the challenges of successful organizational adoption increase significantly with the level of EP maturity. On the other hand, as experience grows in the development towards a higher value of electronic tools in the purchasing function. EP maturity phases can be distinguished to study the adoption of types of individual, i.e. roles or CoPs, in a transition from one phase to the next. General purchasing development models can be used to develop the concept of EP maturity, for instance the phases from Van Weele *et al.* (1998) with transaction, commercial, purchasing, process, supply chain, and value chain orientation.

Industry

An industry can also have influence individual level adoption as several issues relate to specific industry characteristics, like the degree of technical sophistication, service orientation or the amount of dominant players. The EPAM is a general model, derived from insights across five different industries. Arguably, a different set of issues play a role dependent on the industry and consequently different interventions should be applied to achieve organizational EP adoption. In a distinctive or typical industry the specific characteristics are more likely to reflect on the effectiveness of interventions. Future research could focus on different types of industries with typical aspects.

4. Closing remarks

In this paper, several ways are described in which an extension could be made to the EPAM research to further unravel the complexity of organizational EP adoption. These include:

- focusing on influences or interventions to stimulate adoption,
- shifting focus from change phases towards the way in which the spread of adoption takes place,
- extending roles with the theory of Communities of Practice,
- addressing the interplay of individual and organizational level adoption with an actor-to-actor network,
- including EP maturity phases instead of EP in general or specific tools, and
- adopting a focus on one or several specific industrial domains.

The main assumption of a possible extension is that understanding the effectiveness of influences or interventions between people in various situations provides the key towards managing the organizational adoption process. Future research can therefore be directed towards identifying the various influences in a network of actors where the adoption spreads from one actor to another. Using this concept of intra-organizational dissemination of adoption recognizes the dynamic process of different types of people influencing each other and causing adoption behavior to spread throughout an organization.

In order to develop a research design based on the extension of the EPAM, several points have to be resolved. First of all, some definitions have to be set. For instance, adoption, diffusion, dissemination, infusion or utilization are all closely related concept and often used interchangeably. Also the term E-Procurement has been open to various interpretations and encompasses a plethora of different tools.

The question of operationalization and developing measures has to be addressed for the major constructs in the extended research: adoption, types of individuals in a network, types of influences or interventions between individuals, and EP maturity. The development of measures presents some difficult discussions. For instance, there are different ways of operationalizing adoption in literature, varying from simple dichotomous usage or non-usage to more

complex measures of utilization. Also measures related to the spread of adoption, diffusion or dissemination, could simply be the time of the first usage of an IT system, but also more complex usage level measures. Measuring the effectiveness of interventions also presents some practical difficulties: what actually is intervention-effectiveness?; should the received influence be jointly measured with the sent influence?; how can the magnitude of influence be measured?; and is it only positive or is negative influence and adoption also possible?

For the research design some boundaries of the research have to be set: should the scope be limited to intra-organizational adoption or also include external adoption or inter-organizational adoption? How should initial adoption or spontaneous adoption be dealt with? Should the research be limited towards the dyad of actors influencing each other or is researching a complete network feasible?

An important aspect in the research design is the level of detail and focus: how should the amount and choice of types of individuals (e.g. CoPs); portfolio of influences or interventions; and EP phases be determined? How many and which industries should be addressed? These choices can be made before initiation a study, but also be a result from an initial study or a factor analysis.

An extension based on the findings of the EPAM as described above is relevant in several ways; in general, it opens up the academic discussion of adoption issues and interventions specific for the domain of EP. First of all, it can provide a description of actor-to-actor dissemination process of EP adoption. Secondly, it could yield explanations of the incidence and effectiveness of influencing factors in actor-to-actor dissemination based on respective positions of influencer and influencee, the EP maturity and industry. Thirdly, a link can be made between individual and organizational level EP adoption by applying network theory to the domain of EP adoption. This provides an insight is in the dynamic nature of process of intra-organizational EP adoption. Fourthly, the concept of maturity, which already exists for procurement as a whole (Van Weele *et al.* 1998), is extended towards EP.

Practitioners also benefit from this research as prescriptive insight can be derived for managers who

want to stimulate EP adoption in their organization, based on the descriptive models of an actor-network, portfolio of influences or interventions, and EP maturity.

This paper shows that there are some interesting leads for future research in the field of EP adoption. Further research on the topics will be conducted at the Delft University of Technology. Please feel free to contact the corresponding author to join in to this research or enter the discussion on the topics mentioned in this paper.

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