Procurement Maturity, Alignment and Performance: a Dutch Hospital Case Comparison

Marijn G.A. Plomp

Utrecht University, Department of Information and Computing Sciences, TheNetherlands
m.g.a.plomp@cs.uu.nl

Ronald Batenburg

NIVEL, Netherlands Institute for Health Services Research, The Netherlands
and Utrecht University, Department of Information and Computing Sciences, The Netherlands
r.batenburg@nivel.nl, r.s.batenburg@cs.uu.nl

Abstract

Procurement is an important supporting business function, with which competitive advantage can potentially be achieved. In this paper, the relation between maturity and alignment in procurement on the one hand, and procurement performance on the other, is investigated in the case study setting of three Dutch hospitals. The hospitals are benchmarked and it is shown that an increase in maturity of their organization, processes and IT is needed to achieve more alignment and hence better procurement performance. Our general finding is that there is a positive relation between maturity and alignment and performance in procurement. Possible implications for theory and practice are given, as well as directions for future research in this area.

Keywords: Procurement, Maturity, Alignment, Case study, Hospitals

1 Introduction

Although procurement is usually not a primary activity of an organization, it is identified by Michael Porter (1985) as a distinct support function. And even earlier, Peter Kraljic (1983, p. 110) underscores the importance of procurement by recommending organizations to view procurement as a strategic rather than as an operational function. In these days of economical malaise, the adage 'a penny saved is a penny earned' comes to mind quickly. In that context, procurement also deserves

special attention, because organizations spend on average at least one third of their budget on acquiring goods and services (Segev, Beam & Gebauer, 1998). Furthermore, organizations that experience more competition are increasingly aware of the potential benefits of improving their procurement function (Buxmann & Gebauer, 1999).

In the (Dutch) health sector, traditionally a less competitive environment, rivalry is growing and it therefore can serve as a specific example of an 'increasingly competitive environment'. The complexity of the environment and work processes are often mentioned as one of the main barriers for hospitals to cope with innovation and the deployment of IT (Berg, 1999; Berg, 2001; Ball, 2003; Aarts, Doorewaard & Berg, 2004; Ahmad *et al.*, 2002). Lorenzi, Riley, Blyth, Southon & Dixon (1997) define several reasons for this complexity:

- Health services are delivered by a wide range of (chained) institutions, from major specialty hospitals to a complex network of community hospitals, small clinics, and individual professionals.

- Public, not-for-profit, and volunteer organizations are often dominant in the health services arena. There are typically strong humanitarian values that may override commercial or financial objectives.

- Professionals dominate both the definition and the execution of the primary process. In some cases, they also dominate in the management and the governance of the organization (cf. Aarts *et al.*, 2004).

- Health tasks, processes and objectives are difficult to define in advance and are subject of socio-political debate. As a matter of fact, the medical domain is related to fundamental human questions.

- The health system is undergoing fundamental structural change in most countries due to new socio-economic and political insights. Countries struggle with opposing principles between public control on the one hand and market orientation on the other.

Within this internally and externally complex and changing environment, healthcare organizations need to rationalize their supporting processes in order to focus on their core competences. Control and optimization of procurement within hospitals can clearly contribute to this. But how well is procurement organized within hospitals? How well is it aligned with the hospital organization, its strategy and its IT?

In this paper we will look at the procurement performance of three Dutch hospitals. We will do this by applying the Procurement Alignment Framework (PAF; Beukers, Versendaal, Batenburg & Brinkkemper, 2006). We corroborate this framework by validating it in a quantitative and qualitative way. In addition, there will be attention for the issue of how to measure maturity and alignment. The practical contribution of this research consists of a method for analyzing a hospital's procurement function and, for our specific case hospitals, an advice on how to improve the performance of this function.

The structure of this paper is as follows. First, an outline of the theoretical background of this research will be given, followed by our hypothesis. Next, the applied research method will be described, after which the results are presented. These will be discussed

and lead to the conclusion. After the literature references there is an appendix with the used questions.

2   Background and conceptual model

The theory on which this study is build starts with the productivity paradox, which is best described by the following quote: "[W]e see the computer age everywhere but in the productivity statistics" (Solow, 1987, p. 36), which reflects the strange phenomenon that Information Technology (IT) did not seem to improve productivity (or performance). This was an issue at the macro-economical level as well as on the level of the organization; in this paper the focus will be on the organizational level.

In the present day there is general consensus that this phenomenon indeed is a paradox, i.e. that IT *does* in fact increase productivity (e.g. Brynjolfsson & Hitt, 2000). It was found that the relation between IT and productivity is often more complex than 'invest *X* in IT and the productivity goes up by *a* times *X*': for instance, it takes time before such improvements are measurable, and this is generally not taken into account. This can be interpreted as the fact that we are still in an early phase of the diffusion of IT (David, 2000, pp. 75-82), but also as the reality that it takes time for organizations to adapt their processes, culture, products, etc. to the new IT (Brynjolfsson & Hitt, 2000, p. 26).

In that light, an interesting question would be *how* the organization should adapt to IT. This is a topic that belongs to the tradition of the Resource Based View (RBV), which was described as "analysing firms from the resource side rather than from the product side" (Wernerfelt, 1984). Barney (1991) further developed this theory by emphasizing that the RBV focuses on the internal organization and by defining resources as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm". The RBV seems a good way of defining the relations between organizational resources and the performance of an organization. In fact, research even shows significant correlations between the two. The RBV does not make clear however, how these relations work; they remain a 'black box' (Scheper, 2002, p. 16). In other words: correlation does not imply causality.

In order to open up this black box, Scheper refers to the Strategic Alignment model of Henderson and Venkatraman, which defines relations between the four components (i) business strategy, (ii) Information Technology (IT) strategy, (iii) organization infrastructure and processes and (iv) Information Systems (IS) infrastructure and processes. It is stated that these components should be adjusted to each other (i.e. aligned) in order to achieve competitive advantage (Venkatraman, Henderson & Oldach, 1993).

Because the concepts and relations in this model are not operationalized nor clearly defined by Henderson and Venkatraman, it is not very useful for empirical research (Scheper, 2002, pp. 18-19). Scheper proposes his version of the Business IT Alignment (BITA) model. This is an adaptation of the generally accepted model of Turban, McLean and Wetherbe (2001), which is a far descendant of Leavitt's diamond (Leavitt, 1965). In Figure 1 five interrelated components are depicted as the key business

domains that build an organization. Two important concepts are introduced by Scheper in relation to this figure: maturity and alignment.
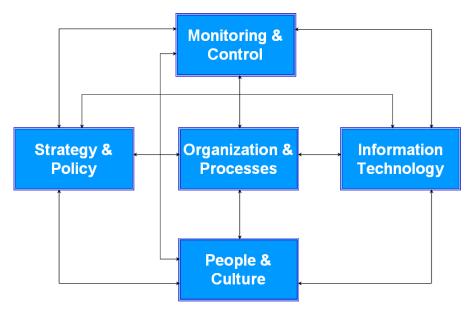

Figure 1: Five interrelated dimensions

In general, the idea of *maturity* is presented by sketching a number of growth stages that depict the potential-upward development or performance of organizations during several sequential periods of time. Within the field of information systems, the Nolan model is often quoted as the origin of the maturity perspective (Nolan, 1979). As for information systems planning, Earl's model of learning curves with respect to IT can be considered as one the first examples of IT-specific extensions to Nolan's model (Earl, 1989). Since then, both the original Nolan and Earl models have been revised, extended, specified and modified, in line with progress made in the field of information systems and software engineering (cf. Galliers & Sutherland, 1991). After publication by the Software Engineering Institute (SEI) at Carnegie Mellon, the Capability Maturity Model (CMM; Paulk, Curtis, Chrissis & Weber, 1993) has become an established model in the field of information systems. It is designed to measure, monitor and evaluate the professional development and engineering of software and many related domains such as IT-governance, project management, people management and so on (Peppard & Ward, 1999), with the assumption that the higher the level, the more mature and the higher the performance of an organization.

With regard to the concept of (business-IT) *alignment,* since the 1980's, scholars, analysts and consultants alike have advocated an aligned approach for the introduction and deployment of information systems (IT) in organizations. One widely cited source is Porter (2001), who argues that the Internet does not make business strategy obsolete. Instead, an Internet and business strategy should coincide, i.e. be aligned. On an operational level, many authors can be cited for the statement that IT implementations should come along with a careful consideration of business processes and other organizational issues (cf. Peppard & Ward, 1999; Hammer & Champy, 1994). Henderson and Venkatraman's Strategic Alignment Model is one of the first models that provided levers for organizations in introducing new IT technologies using

business-IT alignment concepts (Henderson & Venkatraman, 1993). Business strategy, IT strategy, organizational infrastructure and processes, and IT infrastructure and processes should be in balance through strategic fit and functional integration (see also Luftman, Lewis & Oldach, 1993). Subsequently, several authors applied the Strategic Alignment Model. With varying success, the connection between alignment and organizational performance has been investigated (Cragg, King & Hussin, 2002; Kearns & Lederer, 2000; Peppard & Ward, 1999).

The Procurement Alignment Framework (PAF), which is applied in this study, is build on the two pillars maturity and alignment (Versendaal, Beukers & Batenburg, 2005) and the claim that both determine the procurement performance of an organization. Berkowitz and Mohan (1987), Monczka and Trent (1991), Porter (1985), Speckman (1985) and Sutton (1989) define procurement performance from the following benefits when the procurement function is effectively managed: cost reduction, enhanced profitability, assured supplies, quality improvements, and competitive advantage.

Figure 2 depicts the different levels and dimensions and their relation with procurement performance (alignment is not depicted as it is determined by the maturities of the different dimensions). Hence, we define: the independent variable in this research is procurement maturity and alignment, whereas the dependent variable is procurement performance.
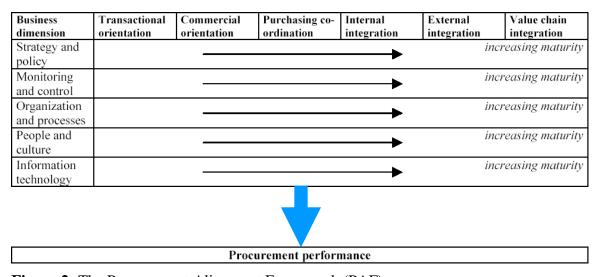
Business dimension	Transactional orientation	Commercial orientation	Purchasing co-ordination	Internal integration	External integration	Value chain integration
Strategy and policy						*increasing maturity*
Monitoring and control						*increasing maturity*
Organization and processes						*increasing maturity*
People and culture						*increasing maturity*
Information technology						*increasing maturity*

Procurement performance

Figure 2: The Procurement Alignment Framework (PAF)

3 Method

Three hospitals participated in the research, as described by some key characteristics in Table 1 below. Clearly, hospital X and Z are comparable companies, whereas hospital Y is much larger.

Table 1: Background characteristics of the three hospitals under investigation

Organization	Number of employees	Purchasing budget	Years of existence in its current structure
Hospital X	1,500	15 million	75
Hospital Y	4,000	70 million	6
Hospital Z	1,600	17 million	14

A respondent from each hospital electronically completed the questionnaire during an interactive procurement managers meeting at an academic site, in the presence of the creators of the questionnaire. The respondents were senior procurement managers. As the questionnaire focused specifically on this domain, the respondents were judged to be able to give answers fitting the company as a whole, making intra-institutional validity likely. The time respondents spent on answering the questions was approximately 40 minutes. The survey used for this research consisted of 60 questions. Most questions were 5-point Likert-scales, with answer categories from strongly disagree to strongly agree. There were 50 PAF statements (10 for each dimension), 8 performance statements (4 'compared to two years ago' and 4 'compared to competitors') and 2 context questions. The questions used are available in the appendix.

Maturity is measured for each dimension by ten statements which are based on the PAF requirements (Versendaal *et al.*, 2005). Because those statements were created in such a way that what is true for one level is also true for all the levels above that one, it is assumed that these levels together form a 'scale', like in the Capability Maturity Model (Paulk *et al.*, 1993). For each of the five dimensions, the procurement maturity was computed by the unweighted sum of the item scores. The PAF maturity statements were recoded from a (summed) scale from 10 to 50 to a scale from 0 to 60, in order to make them more meaningful, just like the original PAF maturity levels (Versendaal *et al.*, 2005). Now every 10 points represent a developmental level. In the same vein, the (aggregated) performance scores were rescaled from 8-40 to 0-60, to enable easy comparison with the maturity scores.

Next, alignment is defined as the degree of leveling between the five business dimensions (cf. Scheper, 2002). This implies that the more the dimensions are at the same maturity level, the higher the alignment score. Different measurements can be used to operationalize this alignment concept. Here, we use the standard deviation (SD) of the array of maturity scores for the Strategy & Policy dimension (S), Monitoring & Control (M), Organization & Processes (O), People & Culture (P) and Information Technology (I).

The combined maturity-alignment score of an organization i is then defined as: $SUM[S_i,M_i,O_i,P_i,I_i]/SD[S_i,M_i,O_i,P_i,I_i]$. This measure increases when the maturity scores are high (larger sum), and/or when the difference between these scores is low (smaller standard deviation)[1]. Hence, the higher the score, the better.

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[1] Note that this measure cannot be used when all the different maturity levels are equal, because then a division by zero would occur (SD = 0). However, this was not the case here.

Performance is measured using statements on how well the procurement managers judged their organization is doing compared to two years ago and compared to how their competitors are doing. Performance is thus operationalized as the *perceptions* of the respondents. Tallon, Kraemer and Gurbaxani (2000) advocate the use of executives' perceptions (for the realized value of IT investments), because according to them, executives know what is 'going on' and research has shown strong correlations between their perceptions and objective measures.

4   Results

Figure 3 presents the maturity scores of the three hospitals on all dimensions, in such a way that it also visualizes the alignment between the different dimensions (i.e. a radar plot).
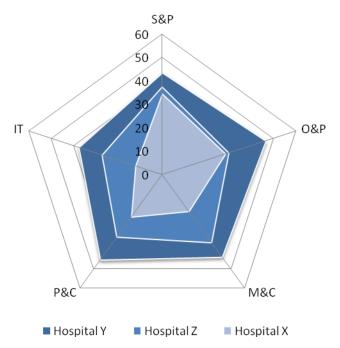

Figure 3: Visualizing alignment

In addition, Table 2 shows the hospitals' procurement maturity-alignment and performance scores.

Table 2: Maturity-alignment and performance scores

Organization	Procurement maturity-alignment	Procurement performance
Hospital X	13.62	26.15
Hospital Y	63.15	39.38
Hospital Z	38.06	31.88

When looking at the specific dimensions, it is interesting to see that in general Strategy & Policy and Organization & Processes are well-developed and that Information Technology stays behind. If we consider the combined maturity-alignment score in Table 1, we see that hospital Y has a very high score, caused by a high maturity and by the small differences between the different dimensions.

The performance scores in Table 2 show the same results pattern, which indicates the relationship between procurement maturity-alignment on the one hand and procurement performance on the other. Hospital Y reports the highest performance, then hospital Z and then hospital X. When we recall our expectation that there is a positive correlation between maturity-alignment and performance, the results for the three hospitals are compliant with this.

As the environmental complexity of hospitals in general is increasing, it can be advised to improve their maturity to a higher level, and to bring all different dimensions to the same level (i.e. to increase alignment). In order to achieve this, hospital Z for example, should specifically increase its maturity on Organization & Processes and IT. Following the PAF requirements (Versendaal *et al.*, 2005) this means applying cross-functional teams that share experiences and possibly involving suppliers as joint problem solvers for O&P. With regard to IT it implies linking the organization's systems to the procurement system and maybe even integrate them into the suppliers' systems.

5   Conclusion

In this paper, we have applied the Procurement Alignment Framework (PAF) to three hospital cases. A positive relation between procurement maturity-alignment and procurement performance of these cases was found. Of course, three data points are insufficient for solid statistical conclusions. These three cases confirm however the evidence found in the literature that there is a positive relation between maturity-alignment on the one hand and performance on the other (Batenburg & Versendaal, 2008). It should also be noted that size plays a role. The larger hospital is far more mature and aligned than the smaller ones and hence has a higher performance. Still, alignment remains a matter of balancing and each hospital appears to have business dimensions for relative improvement. In general Organization & Processes and IT maturity can be improved in the hospitals under investigation. This can done, for instance, by jointly deploying process-driven organization concepts as multifunctional teams supported by integrated IS/IT such as e-procurement. An extended opportunity is

to make use of e-sourcing and on-line auctioning in order to leverage the large-scale procurement of medical equipment and materials in hospitals.

It should be recalled however, that hospitals deal with a complex and dynamic environment. This environment effects the conditions and boundary spanners of the hospital organization to optimize the procurement function. Our framework demonstrates that multiple domains are to be optimized, in order to mature and align procurement and increase its performance. In this respect, it is useful to draw back on the analysis of Berg (1999) who defined the complexity and characteristics of healthcare work as:

- distributed decision making;

- multiple viewpoints;

- inconsistent and evolving knowledge bases;

- ongoing streams of sudden events;

- a constant emergence of contingencies that require ad hoc and pragmatic responses;

- a complex chain of events and decisions;

- a trajectory of small decisions and steps taken by individuals from diverse backgrounds and with varying viewpoints about what is the case and what should be done;

- managing patients' trajectories is a collective, cooperative enterprise;

- the 'articulation' of work amongst healthcare workers.

The PAF covers many of these complexities and particularities, but would need further extension to translate these into a roadmap for procurement improvement in hospitals. Deploying e-procurement implies organizational change, including an adaptation of cultures. There are several important social factors in hospitals that determine the acceptance and final success of IS/IT, such as e-procurement. The IT-dimension of the PAF framework provides a number of aspects to take action and initiate projects to achieve this.

The above leads to the question whether larger companies are per definition more mature, better aligned and hence have better performance. Based on our case studies this cannot be concluded, but our findings do hint towards the inclusion of the concept of *situational* maturity. This would be an interesting issue to investigate further.

The fact that the PAF and maturity-alignment model proves to be valid and useful for hospital organizations, is an invitation to expand it to case studies in other industries and domains. This has already been done for Customer Relationship Management (Batenburg & Versendaal, 2004) and Product Lifecycle Management (Versendaal, Helms & Batenburg, 2005), but other options would be the financial sector or the domain of Supply Chain Management (SCM).

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Appendix: Survey Questions

Context questions
➢ How many employees work in 'your organization' of focus?
➢ What is the yearly budget (in EUR) for this 'spend category' in 'your organization'?

Performance questions
➢ The average time from purchase order to delivery (as for the 'spend category' of focus) has decreased in the last two years.

➢ The average number of 'spend category'-items that do not measure up to the agreed quality has decreased in the last two years.

➢ The average purchase price of 'spend category'-items has decreased in the last two years (controlled for the influence of market forces).

➢ The average purchase cost per transaction as for the 'spend category'-items has decreased in the last two years.

➢ The average time from purchase order to delivery (as for the 'spend category' of focus) is shorter compared to our main competitors.

➢ The average number of 'spend category'-items that do not measure up to the agreed quality is lower compared to our main competitors.

➢ The average purchase price of 'spend category'-items is lower compared to our main competitors (controlled the influence of market forces).

➢ The average purchase cost per transaction for the 'spend category'-items is lower compared to our main competitors.

PAF questions

Strategy & Policy dimension

➢ In order not to run out of stock for your 'spend category'-items, the purchasing department within 'your organization' purchases at appropriate suppliers.

➢ In 'your organization', the price of your 'spend category'-items is considered as a an explicit purchasing selection criterion.

➢ In 'your organization', quality of your 'spend category'-items is considered an explicit purchasing selection criterion.

➢ The procurement department aims for standardization of processes and 'spend category'-items in order to leverage the full potential of procurement.

➢ Procurement vision, strategy and policy for your 'spend category' are evaluated periodically.

➢ The purchasing department makes procurement decisions for the 'spend category' from a context of their impact on 'your organization' as a whole.

➢ 'Your organization' sees the relationship with suppliers of 'spend category'-items as a strategic asset.

➢ 'Your organization' intensively cooperates with suppliers of 'spend category'-items through mutual knowledge sharing.

➢ 'Your organization' monitors the full upstream supply chain (suppliers of 'spend category'-items and even your supplier's suppliers).

➢ 'Your organization' has developed a supplier development program to help them reach excellence for the 'spend category' of focus.

Monitoring & Control dimension

➢ In your organization the authorization of purchases of 'spend category'-items is clearly settled.

➢ Your procurement function is expected to minimize costs against a purchase budget for your 'spend category'-items.

➢ You apply non-standard terms and conditions in your suppliers' contracts for your 'spend-category'-items.

➢ In 'your organization', the purchase department always looks for competitive bids from multiple suppliers of your 'spend category'-items.

➢ Your purchase department has implemented a supplier bonus system (or equivalent financial system) to stimulate the supplier performance.

➢ In 'your organization' markets, products and suppliers are continuously monitored and analyzed, as for the 'spend category' of focus.

➢ Suppliers of your 'spend category'-items are classified based on financial added value and risk (as in the Kraljic matrix).

➢ Performance of suppliers of 'spend category'-items is directly communicated by using key performance indicators.

➢ To improve monitoring and control of the procurement process of 'spend category'-items, you apply value chain integration.

➢ 'Your organization' defines procurement performance measures against world class standards in a joint effort with the suppliers of your 'spend category'-items and your customers.

Organization & Processes dimension

➢ Suppliers provide us with our 'spend category'-items.

➢ Purchase requisitions (draft purchase orders) can be transferred to purchase orders and purchase contracts for the 'spend category' of focus.

➢ 'Your organization' maintains a supplier base for the 'spend category' of focus.

➢ Your purchasing department ensures that there is sufficient availability of 'spend category'-items.

➢ By constantly reviewing the internal procurement business function, purchasing efficiency for the 'spend category' of focus is improved.

➢ In 'your organization' cross-functional teams share existing approaches and create new ideas for procurement of 'spend category'-items.

➢ Your relationships with suppliers of your 'spend-category'-items are based on the idea that suppliers are part of 'your organization's' resources.

➢ Key suppliers are involved as joint problem solvers and you focus on sourcing your 'spend-category'-items through partnerships.

➢ You have process schemes that support the integration of your procurement functions with those of your main suppliers.

➢ Suppliers of your 'spend category'-items are an integrated part of your product development.

People & Culture dimension

➤ Purchase (procurement) of 'spend category'-items is considered a necessary function within 'your organization'.

➤ Within 'your organization', education includes knowledge of purchasing strategies for procurement staff involved in the purchasing of 'spend category'-items.

➤ There is a formal appraisal scheme for procurement staff involved in the purchasing of 'spend category'-items.

➤ Your purchase department explicitly takes the purchasing trends and ethics into account when purchasing your 'spend category'-items.

➤ The employees involved in the purchasing of 'spend category'-items are permanently coached on their working processes.

➤ Your purchase employees involved in the purchasing of 'spend category'-items work in multidisciplinary teams.

➤ There are competency profiles available for the complete purchase staff involved in the purchasing of 'spend category'-items.

➤ Your purchase employees involved in the purchasing of your 'spend category'-items work in teams with employees of your suppliers.

➤ Your employees involved in the purchasing of 'spend category'-items have the complete individual responsibility within their functions to make independent procurement decisions.

➤ Within 'your organization', the recruitment of new purchase employees (to be involved in the purchasing of your 'spend category'-items) is related to the people and culture of your chain partners.

Information Technology dimension

➤ In 'your organization', an information system is used to automate the order handling processes for your 'spend category'-items.

➤ In 'your organization', an information system supports contract management for your 'spend category'-items.

➤ In 'your organization', an information system is used to track suppliers' performance for the 'spend category' of focus.

➤ IT investments within 'your organization' are specifically aligned to the procurement strategy of your 'spend category'-items.

➤ In 'your organization', most of the IT systems are linked to the information system(s) that support(s) the procurement of your 'spend category'-items.

➤ In 'your organization', an information system is used to support shared planning and forecasting with your main suppliers of your 'spend category'-items.

➤ 'Your organization' has established integration into the main suppliers' information systems, for the 'spend category' of focus.

➢ Your organization has direct access to most databases of your main suppliers of 'spend category'-items.

➢ E-business technologies are applied in a specific e-procurement application for the 'spend category' of focus.

➢ The e-procurement system supports direct interaction with the e-business systems of your chain partners, as for the 'spend category' of focus.