Identifying inventory project management conflicts

Vries, de, Jan

Published in:
International Journal of Production Economics

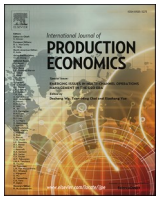
DOI:
10.1016/j.ijpe.2020.107620

Int. J. Production Economics 226 (2020) 107620

Contents lists available at ScienceDirect

International Journal of Production Economics

journal homepage: http://www.elsevier.com/locate/ijpe



Identifying inventory project management conflicts: Results of an empirical study

Jan de Vries

Department of Operations, Faculty of Economics and Business University of Groningen, P.O. Box 800, 9700, AV, Groningen, the Netherlands

ARTICLE INFO

Keywords:
Inventory management
Conflicts
Case study
Typology
Stakeholders

ABSTRACT

Although conflicts are being studied in many different management fields there seems to be a rather restricted number of studies on inventory management-related conflicts and it is for this reason why we conducted a study on exploring the different types of conflicts, their causes and the emerging character of conflicts during the shaping, implementation and usage of inventory systems. In doing so, a framework for assessing different types of conflicts is taken as a starting point. From our case studies, it can be concluded that each of the archetypical conflicts addressed in our framework manifested itself in the companies studied. Our exploratory case studies strongly indicates that during the process of redesigning and implementing improvements inventory management conflicts can evolve in time. Furthermore, in almost all companies studied, the identified conflicts had a multidimensional character and were a mix of the archetypes addressed in our theoretical framework. For project managers it seems to be important to be aware of the different potential conflicts that might arise during the course of inventory projects. The results presented in this article may therefore help project managers to guide projects in the area of inventory management more effectively.

1. Introduction

Both in theory and in practice it is widely acknowledged that due to their multidimensional character, implementing inventory systems can be a complex and dynamic process (de Vries, 2009). Projects in the area of inventory management for instance, are often linked to multiple business processes like sales, planning and purchasing. Moreover, implementing inventory systems not only includes a technical dimension but an organizational dimension as well. Allocating authorities and responsibilities to staff members as well as creating coordinating mechanisms between the stakeholders involved are some examples of organizational aspects of inventory systems which heavily influence the performance of inventory systems (e.g. Kisperska-Morron, 2003). It is for this reason that the organizational embedding of inventory systems has drawn the attention of many scholars (e.g. Bonney, 1994; Rabinovich and Evers, 2002; Zomerdijk and de Vries, 2003). Clearly, in many cases different stakeholders participate in the process of designing and implementing inventory management systems and recent studies indicate that the process of shaping inventory systems rather than a technical process often is a social and political process as well (Abdul-Jalbar et al., 2003). Projects in the area of inventory systems therefore are frequently characterized by a high degree of dynamics and complexity and often go hand in hand with conflicts and political processes (de Vries, 2013).

Although conflicts are being studied in many different management fields amongst which psychology, marketing and human resource management (e.g. Jehn, 1997; Doolin, 2004; Meissonier and Houzé, 2010; Parayitam and Dooley, 2009), there seems to be a rather restricted number of studies on inventory management-related conflicts. Moreover, almost no empirical studies are available regarding the question what the causes of conflicts during the shaping and implementation of inventory systems are. Clearly, the implementation and usage of inventory systems in many cases include organizational issues related to trust, the sharing of information across departmental borders and questions on how to deal with opposing interests of different stakeholders. Previous research in the area of information systems suggests however that conflicts also might be rooted in more fundamental principles (Levine and Rossmoore, 1994; Boonstra and de Vries, 2015) and it is for this reason why we conducted a study on exploring the different types of conflicts, their causes and the emerging character of conflicts during the shaping, implementation and usage of inventory systems.

Starting from the observations addressed above both our literature study as well as the empirical part of our study was structured around the following three questions:

E-mail address: jan.de.vries@rug.nl.

https://doi.org/10.1016/j.ijpe.2020.107620
Received 8 November 2018; Received in revised form 9 January 2020; Accepted 13 January 2020
Available online 15 January 2020

(1) based on existing theories and knowledge on conflict management, what potential types of conflicts can be linked to projects in the field of inventory management;
(2) in case conflicts arise during inventory management projects, what are the main causes and characteristics of these conflicts;
(3) are the result of inventory management projects affected by conflicts between the stakeholders involved and if so, what are the underlying mechanisms behind the impact of conflicts on the results of inventory management projects.

This article draws heavily on seven case studies. In doing so, a framework for assessing different types of conflicts is taken as a starting point. Starting from the notion that inventory systems encompass a physical, planning, informational, and organizational dimension, a framework on inventory-related conflicts is presented. This framework is rooted in recent studies on information system conflicts and categorizes inventory management related conflicts in four types (e.g. Boonstra and de Vries, 2015). In the second part of the article, this framework is used to reveal how conflicts have influenced the shaping, implementation and usage of the inventory systems studied. Consequently, empirical data of seven explorative case studies is presented and analysed. The last section of the article elaborates on some of the main findings of the case studies. First of all conclusions are drawn about the different types of conflicts and on how these conflicts have impacted the performance of the inventory systems studied. Secondly, conclusions are drawn on the applicability of the framework. We see our contribution as a further step in gaining more in-depth and systemised knowledge on recognizing and understanding conflicts between stakeholders during the process of shaping, implementing and using inventory systems. Hopefully, this knowledge will enable practitioners to deal with different types of inventory management conflicts more effectively.

2. Theoretical backgrounds

Recent studies in the area of inventory management reveal that the performance of inventory systems is affected by both planning aspects as well the organizational embedding of the inventory system (e.g. Zomerdijk and de Vries, 2003; Jammernegg and Reiner, 2007; de Vries, 2013). Empirical studies on the influence of stakeholders in decision making processes regarding stock levels as well as the impact of power and interest relationships between stakeholders on the shaping of inventory systems show for instance that inventory management decisions in many cases are subjected to negotiation behaviour (de Vries, 2011). Moreover, decision making processes in the area of inventory management often seem to be characterized by irrational behaviour of the parties involved rather than by straightforward linear decision making processes. The process of designing, implementing and using inventory systems therefore often is not only a technical process but also a process subjected to perceptions and attitudes related to the power and interests of the stakeholders involved.

Despite the widely acknowledged importance of the organizational embedding of inventory systems, in the field of inventory management little to no attention is paid to 'conflict awareness' and the different types of conflicts that might exist when implementing and using inventory systems. Previous studies in the field of inventory management indicate that the process of shaping and implementing inventory systems often are social constructed processes which are rooted in complex social mechanisms between the parties involved. A study on the influence of power and interest on the outcomes of inventory management projects indicates for instance that incongruences between stakeholders on how goals should be operationalized, strongly reinforced the power and interest behaviour of the stakeholders (de Vries, 2013). Additionally, explorative case studies on the process of designing information systems suggest that this behaviour often goes together with conflicts between the parties involved (e.g. Jasperson et al., 2002; Doolin, 2004; Currie and Guah, 2007; Sabherwal and Grover, 2010).

In our study, a conflict is defined as "*a process which begins when one party perceives that another has frustrated or is about to frustrate, some concern of his*" (Thomas, 1992). A conflict in other words, is embedded in interfering goals or a disagreement on interests and can take place on an individual, group or organizational level. It is for this reason why many studies in the field of organizational behaviour, psychology and business management have studied topics regarding the origin of conflicts, the complex underlying mechanisms of conflicts, the way conflicts evolve over time and the way conflicts should be handled (e.g. Coetsee, 1999; Boonstra et al., 2008; Parayitam and Dooley, 2009). Although studies in the area of information studies indicate that conflicts in specific management areas can be different from more overall organizational conflicts only few studies have systematically explored domain related conflicts (e.g. Barki and Hartwick, 2001). Noticeably, it can be assumed that this is also the case for inventory management related conflicts. The process of designing, implementing and using inventory systems for instance often relates to many different management areas in organizations including key-actors from Sales, Production, and Logistics. Projects in the area of inventory management therefore often have a multidisciplinary character and encompass a wide variety of strategical, tactical as well operational decisions. Additionally, inventory management projects encompass not only physical elements but include a planning and organizational dimension as well. The allocation of authorities and responsibilities and the embedding of inventory planning and control systems in the organization are two examples of topics which have a strong impact on the overall performance of inventory systems. Inventory management projects in other words are complex of nature and often have a multidimensional character which easily results in opposing opinions and inventory management related conflicts. Clearly, these conflicts can exist on an individual, group or organizational level and might be rooted in both personal as well as in group related goals.

In order to study inventory management conflicts in a more systematic way, we adopted the IS conflict framework developed by Boonstra and de Vries. (2015). This framework is based on theoretical concepts as well as on eleven case studies and aims at categorizing conflicts in the area of information systems. As can be concluded from Fig. 1, in our framework two dimensions are used to address different types of inventory management conflicts.

The first dimension concentrates on the reach of the conflict; the second dimension addresses the impact of the conflict. The reach of the conflict relates to the question whether the conflict has a more wider

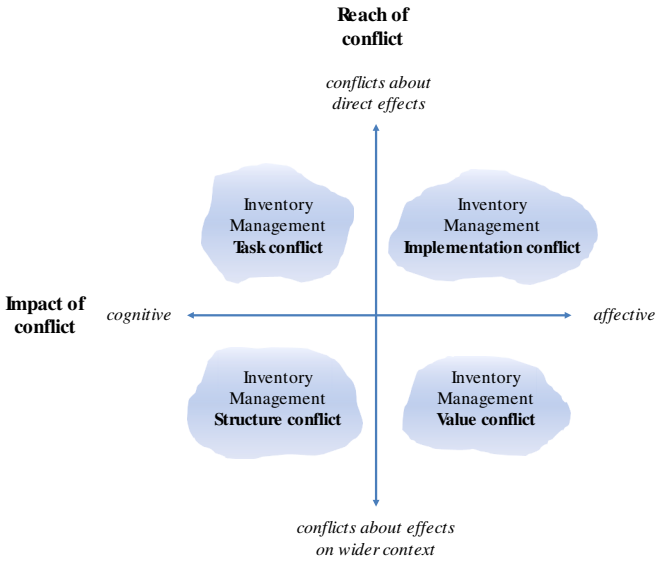


Fig. 1. A framework for inventory management conflicts. (based on: Boonstra and de Vries, 2015, p. 12).

rather than a local and restricted scope. Clearly, inventory management conflicts can have an organizational wide character related to for instance the overall strategy of the company, a dispute on how authorities and responsibilities in the company ought to be allocated, or a strong disagreement on how opposing objectives need to be balanced.

In line with the framework of Boonstra and de Vries. (2015) inventory management conflicts can also be divided into affective and cognitive conflicts. Cognitive conflicts are being addressed in literature as conflicts which concentrate on 'tangible' elements like goals, structural issues and processes (Jehn and Bendersky, 2003; Parayitam and Dooley, 2009; Meissonier and Houzé, 2010). Affective conflicts on the other hand are rooted in the relationships between stakeholders and have more psychological processes as a fundament. Stakeholders involved in a conflict on inventory management for instance, may feel threatened or perceive certain actions and suggestions as a loss of the power they posses.

Based on the scope and reach of the conflict four different types of Inventory management conflicts arise which can be used to describe and analyse conflicts in the field of inventory management. Clearly, these four types are archetypical of nature and it can be expected that in practice conflicts sometimes simultaneously have elements of different archetypes. Additionally, it can be hypothesized that in a practical setting inventory management conflicts may evolve from one conflict into another type of conflict. In the empirical part of our study these assumptions were taken as a starting point to get a more in-depth understanding of inventory related conflicts and how projects in the area of inventory management are being affected by these conflicts.

3. Methodology

In line with previous studies (de Vries, 2011), we consider inventory systems being shaped and designed around four main areas. The physical element of inventory systems relates to the way organizations store products and goods within the company and includes, amongst other things decisions on order picking systems, the warehouse infrastructure and warehouse operations. Additionally, inventory systems also encompass a planning and control aspect. Clearly, in practice numerous decisions on a strategic, tactical as well as operational level related to the products and materials being stored have to be made. Closely linked to this planning and control dimension of inventory systems are the associated information systems and information flows. The organizational embedding of the inventory system can be considered as a fourth main building block which highly influences the performance of inventory systems as well. In practice organizational arrangements regarding stock levels as well as the allocation of authorities and responsibilities frequently hinder companies in meeting required performance objectives. Recent studies in the area of health care management for instance indicates that organizational arrangements regarding the storage of medical devices, health aids and pharmaceuticals often is quite dispersed which negatively influences the performance of inventory systems in hospitals (e.g. de Vries, 2011).

Starting from the notion that inventory systems encompass a physical, planning, informational, and organizational dimension, during the period 2016–2018 two in-depth case studies and five mini cases covering a wide range of inventory related projects were performed. In doing so, we assumed that due to the multidimensional character of inventory systems, conflicts between the involved stakeholders easily may emerge resulting in complex social processes during which one conflict can evolve in another conflict. It is emphasized here that our study did not focus on generating generalizable results but on addressing and unravelling conflict-mechanisms which may take place between stakeholders during the process of designing, implementing and using inventory systems. Clearly, this a 'how' question about a contemporary set of events over which the researcher has minor control. Because our theoretical understanding of how different types of conflicts might be related to each other still shows many gaps and holes, we strongly believe that this phenomenon needs to be studied in its natural setting if one is to understand the nature and complexity of this subject (Benbasat et al., 1987). Together with the explorative character of our research a case-study approach appeared therefore to be the most appropriate (Yin, 1994) and it is for this reason why we decided to conduct a multiple case study.

In line with the notions mentioned above, it was decided to study a set of heterogeneous inventory projects in different settings. In doing so, the main aim was to explore different types of conflicts and how these conflicts might affect the performance of the inventory systems studied. In order to deepen our theoretical understanding of inventory related conflicts the underlying goal of our study was to explore the applicability of the framework presented in the previous section and to investigate whether this framework could be a sound fundament for further research on inventory related conflicts. In so doing, the model depicted in Fig. 1 was taken as a starting point.

When performing the case studies, construct validity was ensured by using several sources of evidence including short surveys, semi-structured interviews, written reports, observations and minutes from internal meetings. Internal validity was sought by looking for patterns and explanations in the material. Additionally, we tried to avoid any bias by asking respondents to comment on our interpretations. Throughout the entire research process, the role of the researchers was limited to making observations and gathering data. The researchers, in other words, were not involved in social and political processes whatsoever during the inventory projects that were studied.

Case study A was conducted at a non-academic hospital located in the Netherlands. The hospital has about 700 beds and handles about 30,000 patient admissions and 140,000 outpatient visits a year. During 2017–2018 an in-depth study was made of the storage and usage of mobile medical equipment, such as drip-feed and blood pressure monitors. Case study B was executed in a public works organization which is part of a Ministry of Traffic, Transport and Urban Planning. The organization is responsible for designing, building and maintenance of roads, (waste) water systems, public green, traffic lights and public lighting.

Data was gathered by means of semi-structured interviews. Semi-structured interviews can offer flexibility to approach different interviewees in a different way while still covering the same area of data collection (Karlsson, 2016). Interviewees received invitations to participate in the research either in person or by mail. Interviews were recorded and transcribed afterward. The selection of interviewees aimed to create a heterogeneous representation of the variety of stakeholders involved in inventory management related decision making processes. An interview guide was used for all interviews conducted. Additionally, the stakeholders were asked to confirm that the transcriptions were what they intended to say. In doing so, this procedure aimed at increasing the constructs' validity (Yin, 1994).

A coding tree was used as a sense-making tool for the interviews using the method described in Karlsson (2016). The coding tree displays how data has been categorized and analysed to explain certain concepts or variables. The codes were inductive or open of nature, which means there was no list of predefined codes but they were induced from recurring patterns or subjects mentioned. A benefit of this coding method is that interviews are not influenced by the existence of predefined codes and the codes are specifically adjusted to the data from the interviews. First, all corresponding text fragments were grouped and assigned a certain code. Double codes were deleted after the codes were matched to a particular theme either deduced from literature or induced. These themes were then assigned to the particular variable they provided an explanation for.

In total, 28 interviews were conducted. At the end of the data-gathering process in both case studies a meeting was organized with all the stakeholders involved. During these meetings an evaluation was made of the conflicts, the underlying causes and the responses to these conflicts. To structure the evaluation process and to analyse the conflicts rich pictures were used to map the underlying mechanisms regarding

the conflicts that were observed. Rich pictures are based on the Soft Systems Methodology (SSM) and are used to analyse complex and dynamic settings to a given problem situation through the identification and linking of a series of concepts (Monk and Howard, 1998).

In addition to the interviews, this research also used process descriptions, documents, enterprise resource planning output and observations as data sources to triangulate the evidence found in the interviews and to gain more or other insights. Observations were performed by shadowing stakeholders with the aim of mapping their job routines and roles in the inventory management process and by attending meetings. In both cases a second round of interviews was conducted to verify the answers of the questions given earlier and/or to gather additional material.

Additionally to the two in-depth case studies five mini cases were performed which followed a replication logic aiming at producing similar (or contrasting results) compared to the in-depth exploratory case studies (Yin, 1994). Basically, the mini cases encompassed the same research design as the in-depth case studies. The main aim of the mini cases was to compare the various inventory management conflicts and to see whether the framework presented in Fig. 1 is suitable for studying a broader range of companies when facing inventory management conflicts. In doing so, we adopted a meta-ethnography research strategy (Noblit and Hare, 1988). The cases selected came from previous studies in the area of inventory management and initially focused on exploring the influence of stakeholder behaviour on designing, implementing and using inventory systems. Starting from the conflict framework described in the previous section, original data was studied, re-interpreted and analysed in order to answer the question what the context and processes of inventory management conflicts are and how inventory management conflicts can be categorized in the framework described above. By presenting empirical evidence from two in-depth case studies and five mini cases, and confronting this data with the inventory management conflict framework we aimed to contribute to a more thorough understanding of the complex mechanisms underlying these conflicts.

4. Case descriptions

Table 1 presents an overview of the context and background of the two in-depth case studies (A,B) as well as of the five mini cases (C-G) .[1] In this section, the empirical evidence of the two in-depth cases is described in more detail. In doing so, we will focus on the context of the inventory systems that were studied and the conflicts that were observed. In the remaining part of this article this data as well as the results of the five mini cases is taken as a starting point to analyse the observed conflicts by confronting them with the framework described in the theoretical background.

4.1. Case A

As already has been addressed above, case A was conducted at a hospital located in the Netherlands. Our study concentrated on mobile medical equipment used by nurses, such as drip-feed and blood pressure monitors. The hospital aims towards cutting costs and gaining more control over the inventory management process because of tighter budgets and new regulations concerning equipment safety. In doing so, our study initially focused on addressing obstacles and problems the hospital should pay attention to in order to reduce inventory costs.

The process of using mobile equipment starts with a demand for equipment, which comes from a patient who needs treatment. A nurse goes to a storage unit or central location to collect the equipment after which the equipment is used to treat the patient. When not used anymore, the equipment is cleaned by a third-party cleaner and returned to the stock unit. Decentral stock units receive generic and high-usage mobile equipment from the central stock point on a daily basis. If a shortage of certain equipment it detected, this is addressed by one of the nurses and a request to increase availability is generated. The stock points are located in multiple departments. Devices however, can also be returned and taken across departments, which complicates the registration process of the mobile medical equipment. In the hospital the basic principle is that purchase managers are responsible for buying the equipment and the medical technical service department being responsible for on-time servicing, maintenance and keeping track of the equipment. The location and usage of equipment is registered manually and no integrated software is used to support this process. One of the problems the hospital experiences is a lack of equipment at assigned places, which frequently leads to nurses searching for equipment. In addition, equipment occasionally is expired because nurses frequently tend to ration equipment so that it is available when they need it. However, in these cases the service department is not able to locate the device resulting in a lacking service and expired equipment.

Asset management estimates the total worth of all mobile equipment in the hospital to be around 80 million euros. Assuming that the cost of maintaining is roughly 10% of total cost per year, this would translate to 8 million per year. Once a year a medical assessment of the equipment takes place. This evaluation is shared with the managing director after which it is decided which equipment should be replaced. If equipment is replaced, this mostly takes place on a one-to-one basis. Internal requests for investments are received and processed by the asset management department. Based on requests from both the asset management department as well as from the medical departments the purchasing department negotiates with third parties when devices have to be procured.

Among the stakeholders, there is some alignment in interests. However, during our study some important conflicting interests became manifest. Almost all interviewees addressed the struggle for finding a proper trade off between safety, traceability, technical capabilities, availability and cost as a main source of conflicts. In satisfying conflicting interests, apparently power played an important role. The head of the purchasing department for instance, indicated that he had sufficient power in the process of managing the stock levels of mobile equipment in order to reduce costs. The manager of the medical department at the other hand reported that his power was only situational and that his primary interest focused on the availability as well as the technical features of the devices. During our study, several stakeholders indicated that a substantial number of conflicts existed between the stakeholders involved in the process of storing, using and buying mobile medical equipment. In general, these conflicts displayed themselves between the purchasing department, medical specialists, nurses and medical department managers. Clearly, these conflicts related to different aspects amongst which the question who ultimately is responsible for stock levels and inventory costs. At the same time it became clear that both medical specialists as well as nurses strongly opposed against making only financial trade offs and emphasized the necessity of also taking availability and quality aspects of the devices into account. During the empirical phase of our study, these conflicts culminated in a dispute on the question whether the stock points of the medical devices including their associated responsibilities, ought to be centralized or not.

4.2. Case B

Case B was conducted at a governmental road entity which is part of a Ministry of Traffic and Transport. The organization is responsible for designing, building and maintenance of roads, (waste) water systems, public green, traffic lights, electro inspection and public lighting. Since 2010 the department of Material Procurement is part of the Public Facilities department since 2010 and is responsible for the storage of goods and warehouse management. Amongst other things, this includes

[1] In order to maintain anonymity, the names of the companies and organizations are not revealed in this article.

Table 1
Overview of the cases.

Case	Organization	Inventory context	Stakeholders	Observed conflicts
A	Non academic hospital	– mobile medical equipment used by nurses and doctors, such as drip-feed and blood pressure monitors	– nurses – doctors/medical specialists – asset manager – purchase manager	– conflicts related to organizational responsibilities (conflicting interests) as well as to the question of centralizing stockpoints – no improvements have been implemented
B	Public works organization (ministry of traffic)	– Long term project aiming at improving the performance of a warehouse management system (street furniture and disaster materials)	– warehouse manager – supervisors – managing director – warehouse employees – procurement manager	– due to different types of conflicts no changes have been implemented. – Conflicts were observed regarding both strategic as well as instrumental issues
C	Manufacturer of garden applications (sheds, chairs, fences, etc)	– inventory management system is only partly implemented – authorities and responsibilities have been re-allocated	– controller – managing director – production planner – sales manager	– during the process of addressing points for improvement conflicts between Sales and Production became manifest – conflicts regarding the allocation of authorities and responsibilities and conflicts on the strategy were observed
D	Medium-sized company specialized in printing standard products	– one year project aiming at reducing inventory costs of final products – project was guided by an external consult	– production manager – sales manager – financial manager – purchase manager	– during the improvement process, there was a strong consensus on the shortcomings of the inventory system – some small conflicts about technical elements of the solutions became manifest
E	Medium-sized company specialized in producing complex electronic devices	– new warehouse management system has been fully implemented – performance of the system does not meet the requirements of sales	– managing director – warehouse manager – logistical manager – production planner – sales manager	– conflicts about both the scope of the project and the way improvements had to be implemented became manifest – there still is an ongoing dispute about the functionalities of system that was implemented. Essentially, this conflict concentrates on a misbalance of interests
F	Medium-sized company specialized in producing high quality chemicals	– long-term project aiming at improving the financial and delivery performance of warehouse	– managing director – financial director – production planner – operations manager – sales manager	– improvements only partly improved due to conflicts on strategy and how to improve the inventory system. – disagreement on organizational embedding of inventory system
G	Medium-sized hospital	– two year project focusing on optimizing stock levels of medicines – new information system has only partly been implemented	– director of hospital pharmacy – board of directors hospital – nurses – medical specialists – staff members hospital pharmacy	– improvements only partly implemented due to conflicts between medical specialist and pharmacy supervisors on improvement directions and performance targets. – dispute about responsibilities and decision-making processes

rejected/disapproved street furniture and fixtures, keeping stock of office stationary and supplies, as well as of disaster materials. For years, there has been a general dissatisfaction among stakeholders about the ineffectiveness and operational performance of the department of Material Procurement. Furthermore, according to internal reports several shortcomings were identified regarding the inventory management system being used. To be able to succeed in optimizing the current state of the inventory system a study was done on how the effectiveness of inventory management practices in the department of Material Procurement could be improved. In doing so, first an in-depth analysis of the current situation was made including the underlying conflicts between the stakeholders involved in the inventory system.

Interviews indicate that the department of Material Procurement has no reliable inventory management system to store and use real-time inventory information resulting in stock-outs and several obsolete or expired products being in the warehouse. Additionally, in the department a lack of synchronization exists between physical and registered stock levels. During the interviews, staff members emphasized a lack of availability of the right tools (e.g. software applications) for executing their work in an appropriate way. Although this situation has been claimed very often with the managing director, no actions have been taken which, according to staff members, illustrates the supervisors' lack of interest and involvement resulting in a conflict between some of the staff members and the managing director. From the analysis of internal reports, conversations and interviews it also became clear that no formal inventory policy exists.

During the years no actions have been taken to improve the situation in the department, and it has been accepted the way it is. This lack of action by both the superiors of the director and the management team resulted in staff members having the opinion that the department of Material Procurement is a non-important department. Moreover, our observations and interviews revealed that different conflicts existed between the stakeholders. A strong disagreement about the priority of the problems that need to be solved for instance, resulted in a personal conflict between some supervisors and the managing director. At the same time, due to a lack of reliable data and misunderstandings on an operational level, conflicts arose between employees involved in procuring materials and products. Additionally, disagreements existed about the organizational embedding of the inventory management system resulting in some strong conflicts regarding the required control mechanisms and the accountability for inventory costs.

4.3. Results of the mini cases

Next to the two in-depth case studies five mini case studies were performed. Table 1 presents an overview of the companies, the context

of the inventory projects as well as of the stakeholders involved in these projects. Additionally, some of the main conflicts that were observed are addressed in Table 1. The five projects of the mini cases show a rather broad range of different inventory settings ranging from a non-academic hospital (case G) to industrial companies producing different types of products and materials case C–F). In all companies, projects were initiated to diagnose and improve the performance of the inventory system. Moreover, in all situations the projects focused on finding a proper balance between reducing inventory costs and improving delivery performance. It is interesting to notice though that only in one case a full and rather successful implementation has taken place (case D). In all other cases, improvements only have been partly implemented.

The analysed mini cases demonstrate different types of conflicts. In four mini cases (C,E,F,G) however, a substantial part of the conflicts concentrated on organizational issues related to accountability, responsibilities and the organizational setting of the inventory system. In line with these conflicts, in all companies a conflict of interest between the stakeholders involved in the project existed. Additionally, frustrations about the redesign strategy and the potential consequences of improvement actions for work processes, procedures and control structures became manifest in at least three companies (case E,F,G). In company G these conflicts lead to a long lasting project with no significant project results at all. Our observations also show that only in one mini case, conflicts related to the inventory system have caused strong personal conflicts (case E). In all other mini cases, the conflicts largely concentrated on both instrumental as well as more fundamental questions but hardly became personal. The results of the five mini cases further show that in all mini cases discussions on potential solutions resulted in conflicts between dominant stakeholders on how a proper balance between different performance objectives could be achieved. Within the industrial companies this became manifest in disputes between parties like Production, Sales, Logistics and Procurement. On a more fundamental level in case G the conflict between medical staff and the pharmacy department, in fact also was a dispute on how to align opposite goals.

5. Discussion of the case studies

The seven inventory management settings studied show a rather broad range of scope, context and project results. Despite the fact that it is tempting to analyse the flow of events of each inventory management project in detail, in this section our primary focus will be on addressing the different types of conflicts that were observed and how these conflicts have affected the implementation of improvements and the usage of the modified inventory systems. In doing so, the conflict framework depicted in Fig. 1 will be the starting point for our analysis.

5.1. Types of inventory management conflicts

It is interesting to notice that in the seven cases studies all four types of inventory management conflicts addressed in our framework can be detected. Clearly, the conflicts observed range from having a rather narrow character to a more wider scope. In case E, F and G for instance the conflicts concentrated mainly on implementation issues and technical problems the companies were facing with respect to their inventory system. Our two in-depth case studies illustrate however that inventory management related conflicts sometimes are rooted in more deeper and wider elements of the inventory system. Both in the non-academic hospital (case A) and the public works organization (case B) the reach of the conflict became wider and started concentrating on the organizational embedding of the inventory system including the allocation of authorities and responsibilities of the stakeholders involved. Moreover, some medical specialists felt their work became more tightly controlled by top management and had the feeling that a more centralized storage of medical devices interfered with their medical accountability.

In our case studies, not only the scope but also the impact of the conflicts differed. In some cases, the conflicts concentrated on rather tangible elements of the inventory system like goals, tasks and business processes. In case D for instance, there was a strong consensus about the shortcomings of the inventory system and only some small conflicts related to the functionalities of the information system became manifest. In case B on the other hand, inventory management related conflicts ultimately culminated in rather fundamental conflicts on topics like leadership, a lack of interdepartmental understanding and having no common goals. During a long range of events, this resulted in many stakeholders feeling frustrated and not taken seriously.

In Fig. 2 an overview is presented of the main inventory management conflicts observed in the two in-depth case studies (A,B) and the five mini cases (C,D,E, F,G). It is noticed here that conflicts sometimes can have a multidimensional character. An in-depth analysis of the conflicts observed in the public works organization (case B) revealed for instance that one conflict encompassed several elements and aspects, which differed in scope and impact. As can be derived from our case data, some elements of the conflict related to instrumental issues. At the same time a conflict of interest between the stakeholders culminated in a heavy dispute on how the warehouse ought to be organized and which strategy should be followed in order to improve the performance of the warehouse. In practice, the four archetypical inventory management conflicts addressed in our conflict framework (Fig. 1) in other words, reveal themselves sometimes in a less transparent way and can be part of more general conflict behaviour. In case G for instance, medical specialists on the one hand and the management of the pharmacy department on the other hand not only got frustrated about a dispute on potential solutions to optimize the storage of medicines but in fact had a deeper disagreement on a shift of control from one party to another.

5.2. Evolving character of inventory management conflicts

The two exploratory case studies as well as the five mini cases clearly support the idea that both within governmental and industrial organizations inventory management conflicts can easily evolve in a complex and dynamic way. Moreover, our observations show that conflicts which originally had a narrow scope and which were affective of nature, during a complex chain of events ultimately culminated in inventory management conflicts having a much wider and fundamental character. In case B for instance, inventory-related conflicts in the beginning had the character of finding proper solutions in terms of implementing information systems and suitable working procedures in order to increase the

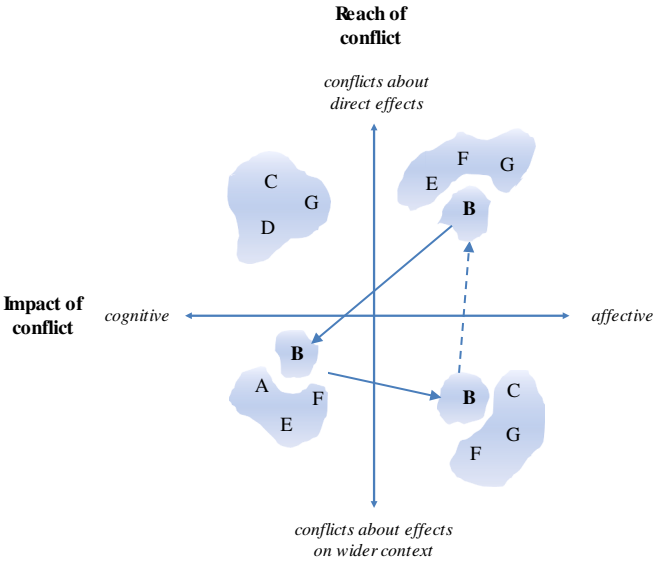


Fig. 2. Overview of inventory management conflicts in the case companies.

performance of the inventory system. After one year however, the scope of the project slowly shifted from an instrumental focus towards a more structural orientation. As already has been addressed above, supervisors and warehouse employees became frustrated by a lack of commitment of top management and it was for this reason why ongoing discussions ultimately resulted in a lack of cooperation, a negative attitude of the stakeholders involved and negotiation behaviour. After several years, no changes whatsoever have been implemented and the project ended in a fundamental conflict on authorities and responsibilities and a strong disagreement between the stakeholders on the degree of autonomy the department of Material Procurement should have with respect to managing and controlling stock levels. In Fig. 2 an illustrative example is presented of the evolving character of inventory related conflicts for case B. Case B also illustrates that inventory management conflicts sometimes can have a vicious and re-enforcing character. In the case of the public works organization, the fundamental conflict on the organizational embedding of the inventory system and the strategy to be followed in order to improve the performance of the warehouse affected the conflicts on the instruments and software tools in a negative way.

It is interesting to notice that the evolving and dynamic character of inventory management conflicts was observed in six of the seven cases. Only in case D during the analysis and implementation phase of the project some small conflicts with a rather narrow reach became manifest. Although no systematic research has been done about the underlying reason for this, our case data suggests that addressing and handling conflicts explicitly may prevent inventory management conflicts from getting a dynamic and negative re-enforcing character. In case D, this process of handling potential conflicts was done by an external consultant.

5.3. The impact of inventory management conflicts

As can be derived from Table 1 in almost all cases project results and initial objectives are only partly achieved in the majority of the cases studied. Our analysis shows that a complex set of mechanisms has contributed to these project results. Ono of the dominant elements which can considered to be accountable for this negative impact however, strongly relates to the conflicts and chain of events observed in the case studies. In literature there is a strong disagreement about the functionality of conflicts. Clearly, conflicts can result in dysfunctional behaviour of the parties involved and are therefore considered to be a negative phenomenon which should be handled carefully (Barki and Hartwick, 2001; Liu et al., 2009). Some authors argue that conflicts and disagreements between the stakeholders involved in projects can be a positive signal which enables the company to improve their performance (e.g. Tjosvold, 1991; Amason, 1996). Our exploratory case studies on identifying inventory management conflicts suggest however, that if these conflicts are not properly handled project results are affected in a negative way. Moreover, one of the re-enforcing elements observed in the case studies which seems to be accountable for conflicts in the area of inventory management is linked to the process of making trade offs when shaping and redesigning inventory systems. Clearly both industrial companies and governmental organizations are confronted with a process of reconciling market requirements with operations capabilities. In doing so, inventory management systems can strongly contribute to this (mis)alignment process and it will be of no surprise therefore that projects in the area of inventory management systems easily result in conflicts on strategic goals, making trade offs, and balancing departmental objectives. In case F a long term project aiming at improving both the financial and delivery performance of the company resulted in a much deeper conflict on the strategic direction of the company. Although less visible, to a certain extent the same process occurred in the two hospitals studied (case A, G). The inventory project on optimizing the storage of medical devices (case A) as well as the project focusing on optimizing the stock levels of medicines (case G) resulted in a conflict between medical professionals on the one hand and supportive staff on the other hand. Basically, in both cases the inventory management conflicts observed were rooted in a strong disagreement between the involved stakeholders about prioritizing goals. The process of storing and distributing medicines and medical devices undoubtedly is intertwined with the process of care and cure and it is for this reason why in case B en G, similar to case F, a more strategic conflict on financial versus (health) service delivery objectives became manifest. Potentially, this conflict could have had a positive impact on the organizations. In both cases however, the conflicts described above were not handled properly and resulted in improvements which were not (case A) or only partly implemented (case G).

6. Conclusions

In order to get a more in-depth understanding of inventory related conflicts this article addressed and studied seven inventory management settings in more detail. In doing so, a framework from the field of information systems was used as a starting point to identify and categorize different types of inventory management conflicts. The main fundament of this framework is rooted in the notion that conflicts can differ in terms of both reach and impact. Based on these two dimensions four archetypical inventory management conflicts were distinguished (see Fig. 1). Next to a literature study, two in-depth and five mini cases were performed in order to get a more thorough understanding of inventory management conflicts in a practical setting. From our case studies, it can be concluded that each of the archetypical conflicts addressed in our framework manifested itself in the companies studied. Clearly, inventory management conflicts can be rooted in a high versus low impact of the improvements proposed during inventory projects as well as in affective and cognitive elements (see Fig. 2). Our study therefore confirms earlier findings that the process of shaping and implementing inventory systems not only is a technical but also a social constructed process in which perceptions, attitudes, frustrations and influential behaviour may play an important role.

Our exploratory study not only confirms the added value of the proposed framework in identifying different types of inventory management conflicts, it also appeared to be helpful in understanding the cause of events during the projects studied in the companies. Our exploratory case studies strongly indicates that during the process of redesigning and implementing improvements inventory management conflicts can evolve in time. Moreover, if conflicts are not handled properly, the reach of the conflict can easily become wider and the impact of the conflict can slowly move towards a more affective character. In almost all companies studied, the identified conflicts have a multidimensional character and apparently were a mix of the archetypes addressed in our theoretical framework. Without doubt, the framework has been helpful in unravelling these combinations of conflicts and in addressing the nature of the inventory management conflicts in more detail. During our case analyses it also became clear that due to the character and nature of inventory management, conflicts in this area easily result in a dispute on strategic goals, making trade offs and balancing opposing objectives. Although not systematically studied the results of the inventory projects further suggest that if conflicts are not properly handled, improvements are only partly implemented or not implemented at all due to frustrations and dysfunctional conflict behaviour of the stakeholders involved.

Except for having a more in-depth understanding of the causes and evolving character of conflicts related to inventory management projects, our study also provides us with some tentative interesting new findings which seems to be worthwhile to study in more detail in future research. Contrary to projects in other management fields, inventory projects apparently often seem to start as a rather technical project aiming at improving the performance by introducing technical solutions. For this reason, initial conflicts often have the character of an implementation conflict which is strongly induced by the stakeholders participating in the project. It is interesting to notice that in our case

studies, structure and value elements of the conflicts were only discussed in a rather indirect way and although further research is required, it can be hypothesized that at the start of inventory management projects the importance of the structure and value dimension of the project, often is underestimated resulting in rather implicit, long lasting disputes between the stakeholders involved.

From a more theoretical point of view, it is interesting to notice that the outcomes of inventory management projects to a great extent can be understood by applying a conflict management approach. Existing conflict theories however, are rather general in nature and ignore relevant details which are specific for the context of inventory management projects. The multidimensional nature of inventory systems which include technical and organizational elements, as well as the specific professional background of the stakeholders involved seem to have an important impact on the conflict behaviour of these stakeholders. Our study indicates that not only the process of implementing changes but also the outcomes of inventory management projects is more strongly affected by this conflict behaviour than is generally acknowledged in studies in the field of inventory management.

This article is only based on two in-depth cases and while the external validity was provided by five mini cases, clearly more in-depth research needs to be done in order to verify and deepen the results of our exploratory study. In particular, more context specific studies on inventory management conflicts may provide a deeper insight into the specific setting of these conflicts and the way they evolve. Moreover, we advocate more interdisciplinary studies on inventory management conflicts in which knowledge from the field of Operations Management is linked to organizational behaviour, project management and organizational theory. Hopefully this will result in a more integrated body of knowledge on inventory management conflicts which may help organizations to identify and handle these conflicts more effectively.

References

Abdul-Jalbar, B., Gutierrez, J., Puerto, J., Sicilia, J., 2003. Policies for inventory/distribution systems: the effect of centralization vs. decentralization. Int. J. Prod. Econ. 81–83, 281–293.

Amason, A., 1996. Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: resolving a paradox for top management teams. J. Inf. Technol. 12 (1), 3–13.

Barki, H., Hartwick, J., 2001. Interpersonal conflict and its management in information system development. MIS Q. 25 (3), 195–198.

Benbasat, I., Goldstein, D.K., Mead, M., 1987. The Case Research Strategy in Studies of Information Systems Case Research. MIS quarterly 11 (3), 369–386.

Bonney, M.C., 1994. Trends in inventory management. Int. J. Prod. Econ. 25, 107–114.

Boonstra, A., Bell, S., Boddy, D., 2008. Stakeholder management in IOS projects: analysis of an attempt to implement an electronic patient file. Eur. J. Inf. Syst. 17 (2), 100–111.

Boonstra, A., de Vries, J., 2015. Information system conflicts: causes and types. Int. J. Info. Syst. Project Manag. 3 (4), 5–20.

Coetsee, L.D., 1999. From resistance to commitment. Public Adm. Q. 23 (2), 204–222.

Currie, W.L., Guah, M.W., 2007. Conflicting institutional logics: a national programme for IT in the organizational field of health care. J. Inf. Technol. 22 (3), 235–247.

Doolin, B., 2004. Power and resistance in the implementation of a medical management information system. Inf. Syst. J. 14 (4), 343–362.

Jammernegg, W., Reiner, G., 2007. Performance improvement of supply chain processes by coordinated inventory and capacity management. Int. J. Prod. Econ. 108, 183–190.

Jasperson, J., Carte, T.A., Saunders, C.S., Butler, B.S., Croes, H.J.P., Zheng, W., 2002. Power and information technology research: a meta-triangulation review. MIS Q. 26 (3), 397–459.

Jehn, K.A., 1997. A qualitative analysis of conflict types and dimensions in organizational groups. Adm. Sci. Q. 42 (3), 530–557.

Jehn, K.A., Bendersky, C., 2003. Intragroup conflict in organizations: a contingency perspective on the conflict-outcomerelationship. Res. Organ. Behav. 25, 187–242.

Karlsson, C., 2016. Research Operations Management. Routledge. New York: Taylor & Francis Ltd.

Kisperska-Morron, D., 2003. Responsibilities for inventory decisions in polish manufacturing companies. Int. J. Prod. Econ. 81, 129–139.

Levine, H.G., Rossmoore, D., 1994. Politics and the function of power in a case study of IT implementation. J. MIS 11 (3), 115–129.

Liu, J.Y.C., Chen, J.V., Klein, G., Jiang, J.J., 2009. The negative impact of conflict on the information system development process, product, and project. J. Comput. Inf. Syst. 49 (4), 98–104.

Meissonier, R., Houzé, E., 2010. Toward an 'IT conflict-resistance theory': action research during IT pre-implementation. Eur. J. Inf. Syst. 19 (5), 540–561.

Monk, A., Howard, S., 1998. The rich picture: a tool for reasoning about work context. Interactions 5 (2), 21–30.

Noblit, G.W., Hare, R.D., 1988. Meta-ethnography: Synthezing Qualitive Studies. Sage Publications, Newbury Park.

Parayitam, S., Dooley, R.S., 2009. The interplay between cognitive- and affective conflict and cognition- and affect based trust in influencing decision outcomes. J. Bus. Res. 62 (8), 789–796.

Rabinovich, E., Evers, Ph T., 2002. Enterprise-wide adoption patterns of inventory management practices and information systems. Transp. Res. E Logist. Transp. Rev. 389–404.

Sabherwal, R., Grover, V., 2010. A taxonomy of political processes in systems development. Inf. Syst. J. 20 (5), 419–447.

Thomas, K.W., 1992. Conflicts and conflict management: reflections and update. J. Organ. Behav. 13 (3), 264–274.

Tjosvold, D., 1991. The Conflict Positive Organization: Stimulate Diversity and Create Unity. Addison Wesley, Reading, MA.

Vries, J. de, 2009. Assessing inventory projects from a stakeholder perspective: results of an empirical study. Int. J. Prod. Econ. 118, 136–145.

Vries, J. de, 2011. The shaping of inventory systems in health services: a stakeholder analysis. Int. J. Prod. Econ. 133, 60–69.

Vries, J. de, 2013. The influence of power and interest on designing inventory management systems. Int. J. Prod. Econ. 143 (2), 233–241.

Yin, R.K., 1994. Case Study Research. Design and Methods. Applied Social Research Methods Series Sage Publications, Thousand Oaks.

Zomerdijk, L.G., de Vries, J., 2003. An organizational perspective on inventory control: theory and Practice. Int. J. Prod. Econ. 81–82, 173–183.