

Master's Thesis

*Successful Interdepartmental Collaboration:
Analyzing the Fit between Task Interdependence and
Coordination Mechanisms in the IT Outsourcing Sector*

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*"Coming together is a beginning, staying together is progress, and
working together is success." (Henry Ford)*

December 2009

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Preface

This is it. My Master's Thesis for my study Business Administration at the University of Twente. This is my final assignment needed in order to graduate. The thesis tells a story about collaboration within an IT outsourcing organization, the interdependencies that are present and the coordination these require.

This story is my final work as a student. And as always the last part is the hardest part. But also with the help of others I made it all the way to the end. I hope you will make it to the end of the thesis also.

This is my contribution to science in general, and to the University of Twente, School of Management and Governance in particular. The thesis provides theoretical implications and advise for further studies concerning collaboration, interdependence and coordination. The thesis also provides practical advice for managers and coordinating staff at IT Outsourcing by which they can improve their collaboration between departments.

Acknowledgements

Only my name is on the cover, but I couldn't have done it without the help of others. In this place I would like to express my gratitude to some people that in one way or the other helped me along the way.

Annet Harmsen, thank you for the opportunity to do my assignment at the research organization and for the support when things didn't go as planned. Tanya and Klaasjan, thank you for the guidance and help on behalf of the University of Twente. Wouter, I will never forget the many hot chocolates we had at the coffee machine where we discussed our research struggles. I would like to thank all my sources on which I could build my research,. Vellekoop and Meesters, my current employer, thank you for the time to work on my thesis and support. Maarten, Ron and René, thanks for the reviews and remarks. And last but definitely not least my girlfriend Leontien and parents Nico and Rita thank you for the support, patience, trust and difficult questions when this thesis would be ready, if ever. Look, I did it.

I hope this research will be informative and valuable to you.

Jan-Joost Stok

Enschede, December 2009



Management Summary

Context and problem analysis

At IT Outsourcing relations between departments are changing. The services of Applications Management (AM) and Infrastructure Management (IM) are organized in separate departments. In the history of these two departments there has been very little need for collaboration. Both AM and IM delivered their services under their own contracts and had little dependencies between each other. Because of changes in technology (i.e. virtualizations) and market demands, AM and IM are required to collaborate more.

A growing number of contracts combine shared AM and IM services in one agreement. As these departments depend on the other's input for accomplishing their own task, the work in one department has direct implications for the work and progress in the other department (**task interdependence**). Therefore, interdependent tasks must be well coordinated. Without effective **coordination**, interdependencies can cause mistakes necessitating rework and creating crises (Loch and Terwisch 1998; Kazanjian et al. 2000). Departments need to identify their interfaces and interdependencies with others and initiate an appropriate amount of coordination (Hoegl et al. 2004). Where relations between departments change the interdependencies can change and related to this the appropriate amount of coordination. Too much coordination is inefficient and too little coordination may cause rework or other problems. This research tries to find the answer to the appropriate amount of coordination regarding the interdependencies between departments in order to be successful.

Research Design

The research is concerned with the level of task interdependence between teams and the appropriate amount and type of coordination between them. This relation between the level of task interdependence and the appropriate amount and type of coordination is referred to as the 'fit'. This is formulated in the main research question:

What is the Fit between Task Interdependence and Coordination Mechanisms for Interdepartmental Collaboration success at IT Outsourcing Outsourcing?

Through the study of relevant theories and empirical practices, literature reading and comparisons a theoretical model is created with scenario's. Using three cases, the results of the level of task interdependence and the different coordination mechanisms in use are related to scenario's of fit. Furthermore outcomes to collaboration success in terms of effectiveness and employee satisfaction are related to the level of fit.

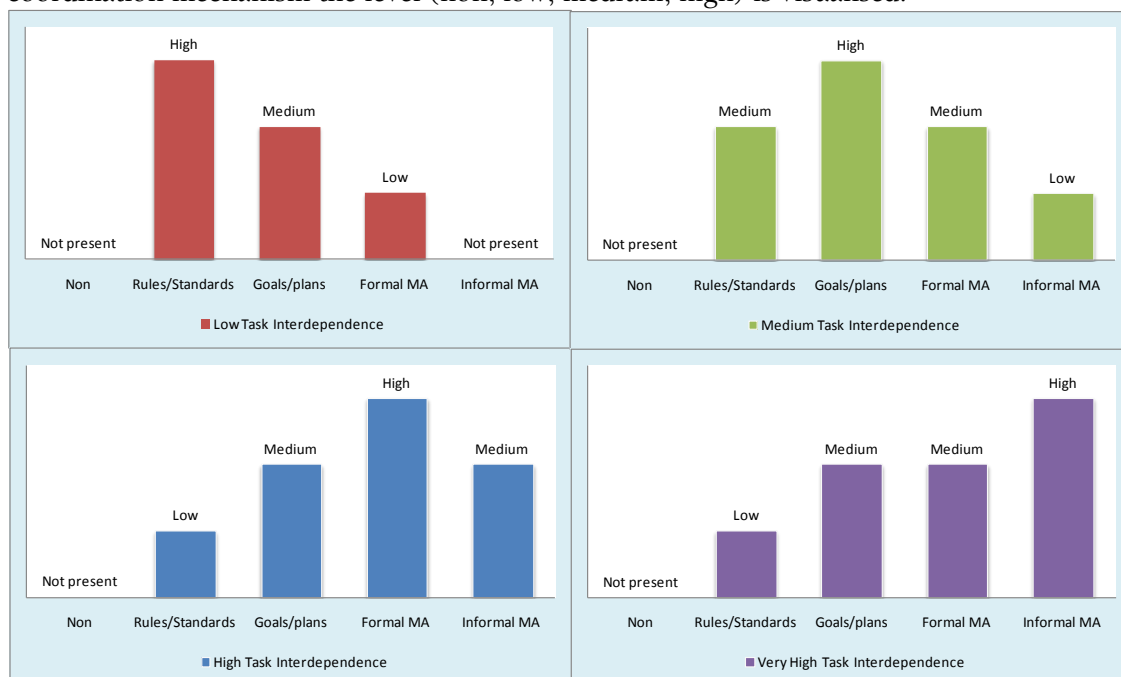
Results and Conclusion

The results of the each case are found in the previous section. The fit is assessed for each case. An overview is stated below. The table shows the degree to which there is a relation between the success of the collaboration and the fit. When there is a fit we expected a high level of success in terms of effectiveness and satisfaction. In the research we found collaborative success when there is fit and no success when there is no fit, except for case B2)

	Effectiveness	Satisfaction	Fit
Case A	low	medium	no fit
Case B			
1 Start	low	low	no fit
2 Middle	medium	high	fit
3 End	medium	medium	no fit
Case C			
1 Process	low	medium	no fit
2 Project	high	high	fit

Transitions have high to very high task interdependence. Most issues with fit are related to too little use of goals and plans as coordination mechanism. Also the different mutual adjusting coordination mechanisms are causing misfits. With no exception a misfit has a low or medium effectiveness and low or medium satisfaction. Project(s) have high task interdependence. There are no issues with fit. Also success is high in both dimensions. In a continuous process there is a medium task interdependence. There is a clear misfit. This is because of limited use of goals and plans as coordination mechanisms, where we expect a much greater use. This misfit comes with a low effectiveness and medium satisfaction.

There is a fit between the level of task interdependence and the use of coordination mechanisms when there distributed according to the following graphs. Each level of task interdependence (low, medium, high, very high) has a single graph. For each type of coordination mechanism the level (non, low, medium, high) is visualised.



Recommendations

For theory

- Very high task interdependence and fit, but no success on effectiveness. Very high task interdependence causes compromises and suboptimal outcomes.
- Beginning of a project no success, in the continuation of the project this bad start hampers effectiveness. Employee satisfaction is easier 'repaired'.
- Teams are more capable of higher levels of coordination than full-time integrators, because teams are not dependent on the "people skills" of a single integrator.

For practice

The main managerial implication is aimed at the fit of task interdependence and coordination mechanisms. Decide on the level of task interdependence, by assessing joined tasks. Then fit coordination mechanisms accordingly.

Within Transitions

- Use more 'goals and plans' coordination mechanisms. A shared transition budget, joined planning and clear transition goals.
- Form a (virtual) team with very high task interdependence. Aim at dedicated members from IM, when possible. Form these teams in an early stage. This takes away personal skills of integrators and liaisons later on and helps preventing rework. A bad start is felt during the entire transition.
- Regarding the mutually adjusting coordination mechanisms, a sufficient amount is present within each department. There are full-time integrators, teamleaders and/or liaisons. Most of these mechanisms are focussed on only one department, where they could (or should) widen their focus across 'the border'.

Within Service delivery process

- Use more 'rules and standards' and 'goals and plans'. This can be realised via a joined SLA. When moments of increased interdependence may occur, a task-force is advised to face the temporary increased need for coordination.

Other short recommendations:

- Aim at centralizing project management unrelated to the departments. The organization has a standardized project management method. Within projects (full time) integrators must have the skills and knowledge to manage both sides. With a common method this is possible.
- Set joined goals and budgets. Remove conflicting performance measurement to stop rewarding conflicting behaviour. This is closely related to a shared budget.

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1. Introduction

Most, if not all organizations are separated into different parts. These parts can be departments or teams, or in the example of an advisory board people that all are responsible for a part of the organization. These parts are always dependent on each other. Sometimes there is little dependence, for instance at a company with regional sales offices. These offices are all part of the same organization and are dependent on each other for centralized purchasing. But there is no direct contact or workflow between these offices. In other organizations like hospitals on the other hand there are a lot of interdependencies. Specialized teams or individuals make sure a patient gets a diverse treatment. The way these dependencies between parts of an organization are coordinated is an important factor for the success of an organization. (Thompson 1967)

It is very common for big multi-nationals to divide the company into separately managed responsibility centres, mostly called business-units. These parts can be managed very efficient, but for an organization as a whole these different parts need to be integrated. This has influence on the interdependencies between these parts. The interdependencies between parts are increasing in today's organization, because of accelerating globalization and geographical dispersion of work (Davidow and Malone 1992; Ghoshal and Bartlett 1990; Doh 2005; Levy 2005; Malone and Rockart 1991), shorter product life cycles (Brown and Eisenhardt 1997), greater knowledge intensity of organizational work (Davenport and Prusak 1998) and networked forms of organizing (Lui and Ngo 2005; Rubery et al. 2002; (Cross et al. 2005). Existing relations in and between organizations are changing and this may call for new ways of collaboration.

1.1 Research Context

The research takes place at IT Outsourcing, part of a worldwide service organization delivering business consulting, (IT) technology and (IT) outsourcing services. IT Outsourcing has 68.000 employees (1st January 2007) working in more than 30 countries in North America, Europe, and the Asia Pacific region, with 7.700 million in revenues in 2006.

IT Outsourcing has over 30 years of experience worldwide with over 15.000 employees. The services IT Outsourcing delivers are applications management, infrastructure management, business process outsourcing, and transformational outsourcing.

This study takes place at IT Outsourcing and concerns applications management and infrastructure management. Applications management is the ongoing maintenance, management, conversion, enhancement and support of an application software portfolio. IT Outsourcing performs this management of applications in the Applications Management practice. This Applications management practice is divided into the management of bespoke (custom) and standard applications (i.e. ERP). In this paper this will be named AM.

Infrastructure management is "A set of services in which IT Outsourcing assumes contractual responsibility for the continuous management of infrastructure ranging from the basic provision of data centre infrastructure through to a fully managed service". The management of infrastructures is divided into the practices Data Centre Services (DCS) and Distributed Delivery Services (DDS). The delivery-practice DCS is responsible for operating systems like UNIX and AS400 and all central and physical facilities like networks (data, telephone), data centres, and the control room. DDS is responsible for the service desk, on site support, and maintenance of desktops, Microsoft/Novell-servers, regardless of the goal or location (Remote or DCA/Level3). In this paper DDS and DCS together will be named IM.

The organization offers applications and infrastructure management services to the business applications and IT infrastructure of client organizations. These services typically consist of

maintaining, enhancing, and supporting business applications and infrastructure. The competitive environment of the industry is characterized by non-distinctive demand, many equal service providers, considerable threat of entry by new players, and the potential threat that clients will have applications management performed in-house again. With little room for differentiation, competition is price-based.

This price-based competition causes a very strong focus on efficiency and utilizing economies of scale. This translates into a continuously changing and learning organization. (Parts of) The IT function of clients need(s) to be integrated into the organization. Because of this IT Outsourcing must be able to adapt to client processes.

1.1.1 Research Problem

The organization in which the research is conducted is an organization where relations between departments are changing. The services of AM and IM are organized in separate departments. In the organization AM and IM are further divided into smaller teams. In this research we consider AM and IM both to be a separate department (or practice) at IT Outsourcing. In the history of these two departments there has been very little collaboration. Both AM and IM delivered their services under their own contracts and had little dependencies between each other. Because of changes in technology (i.e. virtualizations (Gartner 2006)) and demand from the market AM and IM are required to collaborate more. A growing number of contracts currently combine shared AM and IM services in one agreement.

According to the management the results of these shared contracts fall short. Also the general perception is that collaboration between the two departments is troubled. The goal of this research is to get a better understanding about the factors that are of influence to a successful collaboration between these two departments. Because it is predicted by the organization that demand for these services will grow even further, improving the collaboration is important. The projects and contracts that require interdepartmental collaboration at IT Outsourcing are perceived to be less successful than non-collaborative projects. The practical problem as stated by IT Outsourcing is to **find the main factors for success for the interdepartmental collaboration between AM and IM at IT Outsourcing.**

In an early exploration or prestudy (Appendix D) into the collaboration there is looked for topics that were of influence to the collaboration by interviews of managers. The main topics that were named were: insufficient standardisation or coordination, both departments have a different way of working, each department profit & loss accountable, and a limited capacity.

The subject that received the most attention and was an important topic in the very early exploration was the coordination of shared tasks. This brought us to our research focus.

1.2 Research Focus

Like most modern service organizations IT Outsourcing mainly consists of teams. These teams are grouped in departments. As teams depend on other teams' input for accomplishing their own task, the work in one team has implications for the work and progress in other teams (**task interdependence**). Therefore, work details have to be well coordinated. Without effective **coordination** between the teams, interdependencies might produce mistakes necessitating rework and creating crises (Loch and Terwisch 1998; Kazanjian et al. 2000). Teams need to identify their interfaces and interdependencies with other teams and initiate an appropriate amount of coordination (Hoegl et al. 2004). Where relations between teams change the interdependencies might change and related to this the appropriate amount of coordination. Too much coordination is inefficient and too little coordination may cause rework or other problems.

Team research has emphasized on the importance of team-internal processes, but we know little about collaborative processes between teams in multi-team projects (Hoegl et al. 2004). The link between interdependence and coordination is quite common in research (i.e. Thompson 1967; Ven, Delbecq et al. 1976; McCann and Ferry 1979; Wageman 1995). This research takes place in an organization where interdependencies between teams from separate departments are changing. Therefore the research focus is concerned with the level of task interdependence between teams and the appropriate amount and type of coordination between them. This relation between the level of task interdependence and the appropriate amount of coordination is referred to as the 'fit' in this research. This results in following research focus:

The fit between Task Interdependence and Coordination Mechanisms for Interdepartmental Collaboration success at IT Outsourcing.

2. Research Design

In the introduction the purpose for the research is given, together with the research problem. The context in which the research takes place also is treated. This chapter gives the design by which this research finds an answer to the main research question, within the research focus. To achieve this goal research sub-questions are stated that together will form a solution to the problem at hand. The strategy to find answers to these questions is found in the next paragraphs, followed by working definitions of the most important concepts found in the research design.

2.1 Research Questions

This research takes place in an organization where interdependencies between teams from separate departments are changing. Therefore the research focus is concerned with the level of task interdependence between teams and the appropriate amount and type of coordination between them. This relation between the level of task interdependence and the appropriate amount of coordination is referred to as the 'fit' in this research. This is formulated in the main research question:

What is the Fit between Task Interdependence and Coordination Mechanisms for Interdepartmental Collaboration success at IT Outsourcing?

The research sub-questions are derived from the research focus. The words that have an underlining are the constructs of the research. First the separate constructs are studied and then the relationship between them. To get to the answer of this question answers are found to the following research questions, within the research focus.

1. What are the characteristics of Task Interdependence?
2. What are the characteristics of Coordination Mechanisms?
3. What is the Fit between task interdependence and coordination mechanisms?
4. Does a fit of constructs lead to Collaboration Success?

2.2 Research Framework

A method to put the research questions in context is a research framework. The numbers of the research questions correspond to the numbers in the model. In the next paragraph the strategy for answering each research question will be given.

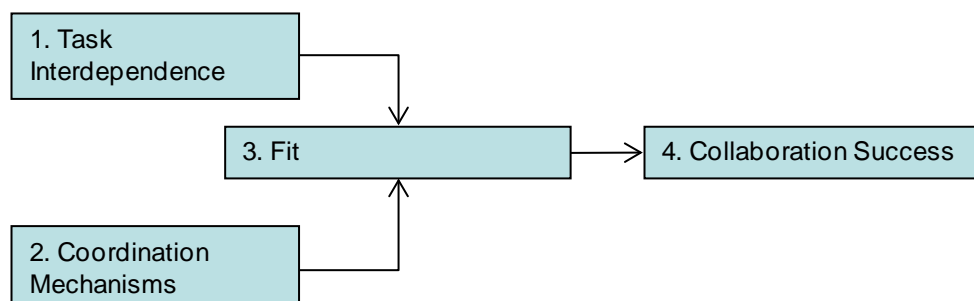


Figure 1: Research Framework

2.3 Research Strategy

The research strategy is a multiple case study. Case study research is very common in social science and business research. Case studies are often qualitative, but can also contain quantitative data in a mix. Yin (2003) had defined a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context. Scholz and Tietje (2002) define a case study as “an empirical inquiry that investigates a contemporary problem within its real-life context”. Case study research may contain only one case, but may also contain multiple cases of which we make cross-case comparisons.

This study will follow the case study method of Yin (2003). The method describes that five components are important for case study research: Research questions (chapter 2), propositions (if any) (chapter 3), selection of cases and unit of analysis (chapter 4), logic linking data to findings (chapter 5), and criteria for interpreting the findings and drawing conclusions (chapter 6). These five components provide a framework for carrying out case studies. The chapter number in which each of the components are described are behind it:

- Research questions (2)
- Using Literature (3)
- Selecting and bounding case(s) (4)
- Designing the study → Case study protocol (4)
- Considering issues of validity and reliability (4)
- Collecting data (4)
- Analyzing data (5)
- Integrating study findings (5)
- Interpreting findings and drawing conclusions (6)

In this chapter the research question is divided into sub-questions. The relation between these sub-questions is drawn into a research framework. The strategy by which the questions will be answered is also given and finally working definitions of the major concepts are stated. Similar to the study of (Sabherwal and Rajiv 2003) and (Brown 1999) our literature review established a rationale for the research. The conceptual framework that has been build out of the literature review will be made concrete by the emerging reality of the cases in the case study research.

In the third chapter a theoretical framework in which the research is conducted will summarize and review the current state of knowledge on our research area. This will form the basis of our theoretical framework. The outcome of the theoretical framework is an expected outcome of the research, according to theory and earlier empirical evidence.

Chapter four contains the research method. In other words how the research is performed. It discusses the research setting, the method and measures by which the data is collected. The following chapter, chapter five contains the results of the research. After an analysis of the data the results are discussed and put into the perspective of the theoretical model as formed in chapter three. The validity and reliability of the data are also discussed here. The final chapter contains the conclusion of the research. After a critical of review of our own research implications to practice and theory according to our findings conclude this thesis.

2.4 Definitions of Concepts

Before advancing to the next chapter these are working definitions of the constructs in focus of the research.

Collaboration: is a process in which parties, when working together explore their differences and go beyond their own vision. (Gray 1989)

Coordination: Refers to the mode of linking together different parts of an organization to accomplish a set of collective tasks. (Ven et al. 1976)

Coordination Mechanism: Tools to increase/improve coordination.

Fit: Contingency theory's fundamental assumption is that there is no one best way to organize. Central to contingency theory is the concept of fit between structural and contextual (contingency) characteristics of organizations (Donaldson 1994). Failure to attain such fit should result in inferior outcomes (typically, the outcomes are some aspects of performance).

Success: Satisfaction of any group inside or outside the organization that has a stake in the organization's performance. (Daft 2001)

Task Interdependence: Refers to the intensity and direction of a workflow (or decision making) relationship.

3. Theoretical Framework

3.1 Task Interdependence

A short explanation and preliminary definition of interdependence is given in the previous chapters. In order to find the answer to the first research question this chapter will elaborate on this construct. First is a review of the current literature on interdependencies between units within an organization. A selection of relevant literature and search for definitions and measurement criteria is made. After a summary of the used literature the most common definitions, measurement criteria and relations with other constructs will be discussed.

3.1.1 Literature Selection

A structured search in the management literature is performed in order to create a solid theoretical framework. This is done by selecting respected journals to search with selected keywords for state-of-the-art articles on the research subject. After this first search a selection of articles is read in order to select relevant references. Also by a forward search, articles that refer to the selected journals may be of relevance. All of the top journals are in the database of 'Web of Science'.

The first step is the selection of respected journals. This is done by looking into the rankings of management journals (Saunders 2001). The result is a top 15 of journals to search in and to narrow down the search.

During the second step the keywords are determined and articles are searched at the 'Web of Science'. The keywords searched with are translated into one query: "collaboration OR cooperation OR interdepen*". This search is on articles published in the last 5 years. This is done for two reasons. The first reason is to cover the current state-of-the-art on the subject. Because research builds on earlier findings, the most important articles and findings published more than 5 years ago should be covered. The second reason is that a full search on all articles would be too time consuming. The search resulted into 114 articles. Based on a set of criteria relevant articles are selected for analysis. Based on the title and abstract the articles are evaluated on the following selection criteria. The result is a selection of 43 articles.

- The papers are written in English
- The study covers collaboration or interdependencies of departments or groups within organizations.
- The study setting has similarity in country/region (Europe / US) to the research setting.

The third step is a backwards reference search. By reviewing the citations for the articles identified in step two, prior articles that should be considered are found. This search results in another 83 articles with 36 articles matching the same selection criteria and that are available. This result of the literature selection is a set of 79 articles. These articles can be older than 5 years.

In the fourth step all these articles are imported into EndNote reference Software. This software makes it possible to perform a structured search into articles and other references. Of these articles not only the highly necessary reference data is entered, but also the type of article, keywords, a summary, the unit of analysis, and a label for quick reference.

In the fifth and final step the articles are all downloaded (where possible) and read. Unfortunately not all articles were available because of required subscriptions to journals or because it were (sections of) books not available in the library database. Another group of articles that match the selection criteria based on the abstract are also removed from the sample, because the content does not match these criteria. Finally a group of 18 articles is selected for further analysis.

In the group of selected articles and books discussing task interdependence Appendix B is an overview for comparison and analysis. The different rows display important aspects of the construct. The first is an overview of the type of interdependence discussed in the article. The second shows the unit of analysis. The third states whether measured or discussed interdependence is based on perceptions or actual interdependencies. The following two rows state the findings of the research and the research methodology (number of cases, type of research). In this chapter all the important outcomes of the overview are elaborated on.

3.1.2 Concepts of Interdependence

Interdependence among people and groups in organizations is studied in different forms. The two most common forms of interdependence that are found in the literature are task interdependence and outcome interdependence. Where task interdependence describes the degree to which a task requires collective action, outcome interdependence is concerned with the way that goals are defined and achieved and the way that performance is rewarded (Wageman 1995).

In various studies task interdependence is studied. In the literature there are different concepts of task interdependence. Common views on task interdependence are that of Thompson (1967), McCann & Ferry (1979) and more recent that of Wageman (1995). Table 1 shows the articles that refer to these common views. In the following sub-paragraphs these most common concepts of task interdependence are summarized and reviewed.

Task Interdependence (Thompson 1967)	Inter-unit Interdependence (McCann and Ferry 1979)	Group Task Interdependence (Wageman 1995)
(Adler 1995; Hoegl et al. 2004; Kazanjian et al. 2000; Ven et al. 1976; Victor 1990; Wageman 1995)	(Hoegl et al. 2004)	(Sethi 2000:b; Vegt 1998; Wageman and Baker 1997)

Table 1: Concepts of Interdependence

Task Interdependence

In the articles that discuss interdependence among departments or organizational units the theory of Thompson (1967) is one that is widely accepted and built on (i.e. Adler 1995; Andres and Zmud 2002; Victor 1990). According to Thompson interdependence is “the extent to which individuals, departments, or units in a given organization depend on each other for accomplishing their tasks” (1967). He describes it as characteristic of work that is inherent to the technology of the task. Within this view Thompson defined three types of interdependence: pooled, sequential and reciprocal. A fourth type has been added by Van de Ven et.al.(1976). This fourth type is called interdependence in a team arrangement.

Pooled interdependence is the lowest form of interdependence. It exists when no work flows between units. The units contribute to the company, and the company supports the units. In the example of regional offices of a bank, these offices are working autonomously. No work flows between the offices.

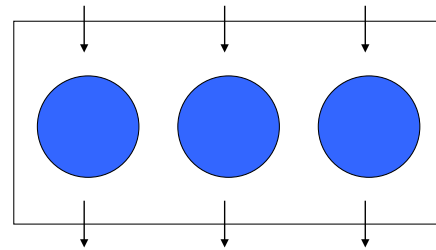


Table 2: Pooled Interdependence

Sequential interdependence is a higher form of interdependence. The work between units flows in only one direction. The output of one unit becomes the input of the other unit. This type of interdependence is very common in an assembly line. Sequential interdependence implies a one-way flow of materials, so extensive planning and scheduling is needed.

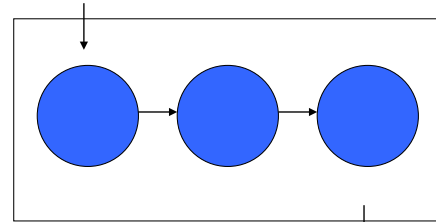


Table 3: Sequential Interdependence

Reciprocal interdependence is the highest form of interdependence in the typology of Thompson (1976). The output of a unit is the input to another unit. And the output of the second unit is input to the first unit. Examples can be seen in the case of new product development, where separate units perform tasks that are input to other units, but where the output of the other unit can be input to first unit.

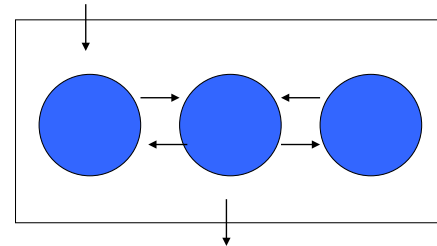


Table 4: Reciprocal Interdependence

The fourth type of interdependence (Ven et al. 1976), interdependence in a team arrangement refers to situations where “the work is undertaken jointly by unit personnel who diagnose, problem-solve and collaborate in order to complete the work. In team work flow, there is no measurable temporal lapse in the flow of work between unit members”. This distinguishes it from sequential and reciprocal interdependence. The work is done by personnel at the same point in time. Examples of team work interdependence in organizational units include a group of researchers designing a study as a think tank.

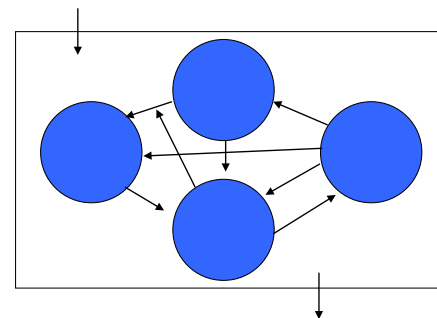


Table 5: Interdependence in Team

In organizations interdependence is always pooled. More complex organizations have sequential and pooled interdependence and the most complex organizations have all three forms of interdependence. A problem with this type of scale is that it is hard to compare interdependence. “Are three pooled interdependencies greater or less than one reciprocal interdependency?” (McCann and Galbraith, 1981:64). The measurement and empirical testing of this construct has imposed serious problems. In a study by Van de Ven et al. (1976) building on the scale of Thompson it is assumed that pooled, sequential, reciprocal and team work interdependence imply increasing levels of task interdependence. It would be ideal if the responses of respondents could be weighted to arrive at an overall measure of task interdependence. Unfortunately, it is not possible to test such a scale directly because responses are forced to add up to 100 percent.

Thompson predicts that the degree of interdependence influences coordination strategy selection. He predicts that managers will select other coordination mechanisms when the degree of interdependence increases. Van de Ven et al. (1976) found interdependence was positively associated with the reported use of local and cooperative coordination strategies such as horizontal communication channels and unscheduled meetings. Interdependence was found to be negatively related to the use of coordination strategies such as rules, plans, and use of vertical channels. Also other empirical research supports Thompson's theory. A review of interdependence by Victor (1990) found the Aston studies indicated that work flow interdependence was positively related to the localization of authority and negatively related to the degree of formalization (Hickson, Pugh and Pheysey 1969; Child 1973; Aldrich 1972). Hrebiniak (1974) found a significant positive relationship between interdependence and participativeness in decision-making, and significant negative relationships between interdependence and both the use of rules (formality).

A redefining of the construct by McCann and Ferry (1979) is done to overcome measuring problems of task-interdependence as found by McCann & Galbraith (1981) and Van de Ven et al. (1976). In the next section this will be elaborated on.

Inter-unit Interdependence

Another definition is that of McCann and Ferry who state that interdependence exists when actions taken by one referent system affects the actions or outcomes of another referent system (1979). The specific actions in unit A which affect actions in unit B are at best difficult to find out. Without constant and costly monitoring, the extent of actual interdependence between two units is impossible to determine. The practical solution is to operationalize interdependence in terms of the resource transactions which occur between units. They then call it a transactional approach to interdependence. According to this theory managers of groups have four fundamental tasks in collaboration with other groups or units: (a) assess the degree of interdependence with other units; (b) determine the management costs entailed; (c) share these perceptions with the other units to the degree possible; and (d) decide upon which joint coordinative behaviours to use. (McCann and Ferry 1979)

By the following six criteria the level of interdependence is defined.

1. Number of different resources involved
2. Amount of resource transacted per unit of time
3. Frequency of transactions per unit of time
4. Amount of time before loss of resource impacts outcomes (slack)
5. Value of resource
 - a. Cost of substituting different resource
 - b. Cost of locating another supplier or user
 - c. Qualitative importance of resource
 - d. Percentage of time needs satisfied in past
6. Direction of resource flow

Figure 2: Measuring Transactional Interdependence – (McCann and Ferry 1979)

Differences in perceptions of interdependence are a source of inter-unit conflict. By only looking at the transactions between units, perceptions are ruled out and there is less conflict. Other than the construct of Thompson this construct has an ordinal scale. By assessing the (1) number, (2) amount, (4) slack, (5) value and (6) direction of resources between units, and the (3) frequency of transactions per unit the transactional interdependence between units can be measured (Figure 2). This is a big advantage in comparison to the task interdependence construct in the previous section. But this view has the disadvantage that it does not take reciprocity into account. Scheduling and time specific characteristics might be just as important as the resources itself. Because this construct does not take this into account it cannot accurately represent the amounts of interdependence (Victor and Blackburn 1987). There is little evidence supporting the view of McCann and Ferry.

Group Task Interdependence

A third view to interdependence is that of Wageman (1995). Where the work of Thompson is one of the most cited, the work of Wageman is also attracting some attention. This study differs on some fundamental point with previous studies on task interdependence. Where Thompson and McCann&Ferry (1979) among others, assume that all members of groups are equally interdependent, Wageman (1995) and Wageman & Baker (1997) have pointed out that the degree of interdependence among members in groups may differ greatly. The research examines the separate and joint effects of different levels of task interdependence (low, hybrid and high) on the effectiveness of working groups in organizations. A group where different members are low task interdependent and high task interdependent is considered hybrid interdependent. The interdependence as discussed in Wageman's article is considering task interdependencies within group or teams, instead of between groups.

According to some definitions task interdependence is a structural feature of work. The characteristics of work are inherent to the technology of the task (Thompson 1967). Others state that tasks can be designed to be performed at varying levels of interdependence, not limited by technology (e.g., Shea and Guzzo, 1989). Wageman acknowledges both perceptions and puts them together. She puts Task interdependence as *"a structural feature of work, but tasks can be designed to be performed at varying levels of interdependence."* The features (or technologies) that define a task create a level of interdependence that in turn may influence how much unit members interact in executing the task (Hackman, 1969).

The research investigates the performance and processes of 150 groups of technicians at the U.S. Customer Services division of Xerox Corporation. Different technicians experience three distinct forms of task interdependence (low, hybrid and high). The fit between the type of task and outcome interdependence is related to group effectiveness of technicians who repair machines. The study finds that task interdependence and reward structure should be aligned for the best group performance. Groups with members that are low on task interdependence are the most effective when the members receive individual competitive performance rewards. Groups with members that have highly interdependent tasks are the most effective when they receive group based rewards. Groups that have hybrid tasks or that receive both group and individual rewards are the least effective. In this study no significant interactions between task and outcome interdependence were found. In a following study Wageman and Baker (1997) surprisingly found that while reward interdependence is important to performance, task interdependence, but not reward interdependence, drives observed cooperative behaviour. This supports our reasoning that task interdependence is an important factor for determining successful cooperative behaviour.

3.1.3 Level of analysis

Organizations can be viewed on multiple levels. Individuals work in groups or departments. These departments may be part of a business unit that is part of a larger organization. With regard to task interdependence researchers have focused on different levels in organizations. The overview tells us that most articles are analyzing on the group level. Although this image may give the idea that the articles have the same view on this, this is not the case. A more detailed study on the level of analysis shows that there is a difference between studies about task interdependencies within groups and between groups.

The early research on interdependence is considering how large groups, mainly departments, are task interdependent. This is what we call System Level Interdependence (McCann and Ferry 1979; Thompson 1967; Ven et al. 1976). Because of trends already referred to in the introduction (globalization, geographical dispersion, short product cycles, network like organizations) another group of researchers is studying intergroup interdependencies, what we call Team Level Interdependence. More recent literature that studies group behaviours and team performance analyse task interdependencies within groups. We call this In Team Interdependence (Hoegl and Gemuenden 2001; e.g., Vegt 1998; Wageman 1995; Wageman and Baker 1997).

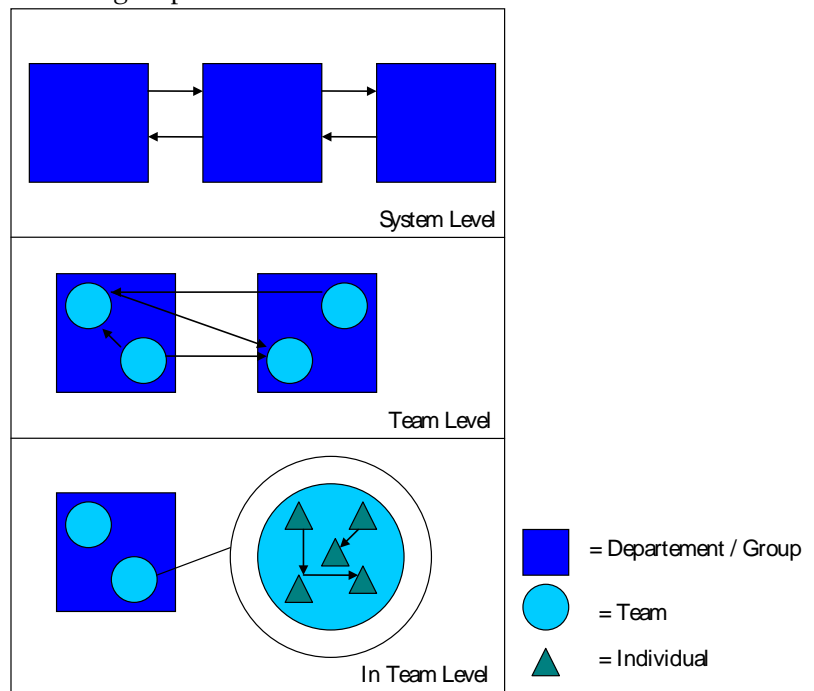


Table 6: Levels of Interdependence

In Team Level Interdependence

A study on interdependencies within teams on the individual level of task interdependence is that of Van der Vegt (1998). The author assumes that the degree of task interdependence within groups may vary across group members, irrespective of the degree of team-level task interdependence. The study then relates the individual (In Team) level of task interdependence to the outcome of the group. Van der Vegt also acknowledges that groups may differ in the degree of task interdependence. Because our study is considering outcomes of several groups combined, a study on the individual level seems not applicable in our situation. We consider task interdependence to be a characteristic of a team or group as a whole.

Team Level Interdependence

Several topics related to interdependence between teams are part of modern day studies, mainly related to R&D/Innovation and software development. Studies in relation to multiteam R&D projects are those of Kazanjian et al. (2000) and Hoegl et al. (2004). On the level of analysis the inductive research of Kazanjian et al. (2000) proposed task interdependencies on different levels of a multi-team project: within team interdependency, across team interdependency, and system level interdependency. The article induces theory from large development projects with ambiguous outcomes, like that of aircrafts, cars or computers. They propose that the multiple levels of interdependence affect creativity. Because of increased coordination requirements in complex projects there is less time for

creative solutions. They find that even the best attempts at developing an organizational architecture to handle such complexity are never perfect. Crises always arise during the design process. These crises are significant events where creativity occurs and new technical knowledge is generated. These findings should be handled with care because there is no empirical testing of the propositions, but the multi-level interdependencies look promising for future research.

The study of Hoegl et al. (2004) also covers multiteam projects for the development of highly complex products. They acknowledge that team research has emphasized on the importance of team-internal processes, but that we know little about collaborative processes between teams in large-scale projects. This study utilizes a multi-informant longitudinal research design on a product development project in the European automotive industry investigating collaboration between and within teams. The results of the study demonstrate that interteam coordination, project commitment, and teamwork quality as rated by the team members at the start of the project are significantly correlated to project managers' ratings of overall team performance at the end of the project. Task interdependence in the study is closely related to interteam coordination. Task interdependence and changes occurring during the development process are the forces that create these interteam coordination needs. In this study Task interdependence refers to the intensity and direction of a workflow relationship between two teams (Gerwin and Moffat 1997, p.301).

Another set of articles discuss task interdependence between R&D and other departments of functions, like Marketing (Gupta et al. 1986) and Manufacturing (Adler 1995). In discussed articles that classify interdependence, such as those by Thompson (1967), McCann and Ferry (1975), and Victor and Blackburn (1987a) an important dimension is missing in relation to (innovation) projects, namely the temporal dimension (Adler 1995). Within a time-bound project, departments experience different degrees and types of interdependence, and they interact with varying intensities and via different coordination mechanisms. As a result both interdepartmental interdependencies and coordination mechanisms are not constant over time. Before the research of Adler (1995) organizational research has not often confronted this problem. The focus of almost all the literature has been on coordination in ongoing operations. Respondents are typically asked to give an overall characterization of the nature of their interdependence and of the main coordination mechanisms (i.e. Van de Ven et al. 1976). But in studying time bound projects, such an approach will miss the temporal dimension. The study of Adler has proven that in under different time pressures, because of different phases in a project other interdependencies require different coordination mechanisms.

3.1.4 Measurements

Most studies that measure task interdependence use subjective measures in the form of questionnaires and interviews, but there are a few studies where task interdependence is measured objectively. When measuring subjectively, respondents are typically asked to give an overall characterization of the nature of their interdependence (i.e. Van de Ven et al. 1976).

Perceived interdependence has been found to be distinct from objective interdependency (Tjosvold, 1986) due to reasons such as bounded rationality and uncertainty (McCann and Ferry, 1979). It is important to distinguish between objective and subjective amount of interdependence as some studies have shown that even individuals who predominantly perform their work independently experience varying levels of interdependence due to varying perceptions (Shea and Guzzo, 1987; Tjosvold, 1986; Wageman, 1995).

Like Adler (1995) poses, and as we can find in the figures above, these measurements of task interdependence are aimed at continuous operations, where many organizations are (also) working in projects. The possibility that the level of task interdependence of projects is the

same seems very small. There are many studies that use such a project specific approach. (Victor 1990; Wageman 1995; Wageman and Baker 1997; Sethi 2000:a)

There are also studies that had the opportunity to manipulate the level of task interdependence in a laboratory setting. The advantage of these studies is that they have the luxury to alter variables in a controlled environment, which reduces bias. But in general these studies pose serious problems with external validity and generalization. (Andres and Zmud 2002; Victor 1990).

Almost every research uses subjective measures for defining the level of task interdependence. When a group does not consult with another group, with whom they (in retrospective) have an interdependent task this increases the possibility for mistakes or rework. The opposite situation when a group consults another group, although they could perform the task without this consultation (coordination) costs will increase.

3.1.5 Summary

The study of interdependence has changed substantially over time. Shifts can be observed from nominal typologies to ordinal typologies, shifts in levels of analysis, and complexity of the research models, as the studies of Hoegl et al. (2004) and Adler (1995) reveal.

In the previous sections we described different definitions and perspectives on task interdependence in both theory and practice. According to Thompson (1967), interdependence is the extent to which individuals, departments, or units depend on each other for accomplishing their tasks. He defines three types of interdependence, which is expanded by Van de Ven et.al.(1976) into four types being; pooled, sequential, reciprocal and interdependence in a team arrangement. The problem with the types of interdependence, is the lack of scale, therefore making it difficult to measure.

McCann and Ferry (1979) state that interdependence exists when actions taken by one referent system affects the actions or outcomes of another referent system. They defined six criteria to assess the level of interdependence, creating an ordinal scale. Unfortunately there is little theoretical evidence supporting their views.

Like McCann and Ferry, Wageman (1995) also uses an ordinal scale, by examining the separate and joint effects on different levels of task interdependence (low, hybrid, and high) on the effectiveness of working groups in organizations. Unlike Thompson, McCann and Ferry, she points out that the degree of interdependence among members in groups may differ greatly, thereby using a different level of analysis.. In Table 6 we defined different levels of analysis on which task interdependence may be found.

3.1.6 Conclusion

The definition that fits our research focus must be a definition that applies to task interdependence in an environment where groups within and across departments have interdependent tasks. Therefore, the level of analysis most suitable for this research is the team level interdependence. Because our study is considering interdependencies between several groups, a study on the individual level seems not applicable in our situation. In line with our used definition we study task interdependence to be a characteristic of a team or group as a whole. As the study of Van der Vegt (1998) demonstrates task interdependencies between individuals and between groups are not related. By studying task interdependence on an individual level, these results will not contribute to our research question. We consider task interdependence to be a characteristic of a team or group as a whole. In Table 6 this is the Team Level: Interdependence between inter- and intra-departmental teams.

The definition that is the ground for our definition is found in the article of Hoegl et al. (2004) which is a definition of Gerwin and Moffat (1997, p301), which finds its origin in the work of Thompson (1967).

Task Interdependence: Refers to the intensity and direction of a workflow (or decision making) relationship.

The two main components 'intensity' and 'direction' find their origin in respectively Gerwin and Moffat (1997) and Thompson (1967). To extent the actual working, a third factor 'decision making' is added from Hrebiniak (1974).

1. Intensity of workflow
2. Direction of workflow (pooled, sequential, reciprocal)
3. Level of shared decision making

Measurements

The intensity of workflow is being measured on a ordinal scale, stating the amount of shared tasks. The direction of workflow is divided on a nominal scale into pooled, sequential, reciprocal. Like intensity, the level of shared decision making is measured on a ordinal scale, stating the amount of shared decisions.

3.2 Coordination Mechanisms

In earlier chapters we gave a small explanation and preliminary definition of coordination and coordination mechanisms. In order to find the answer to the second research question this chapter will elaborate on these constructs. After defining coordination we will give a review of the current literature on coordination mechanisms between units within an organization. A selection of relevant literature and search for coordination mechanisms in organizational theory is made. After a summary of the found literature the most common definitions, measurement criteria and findings will be discussed. Concluding to this section we make a classification of coordination mechanisms.

3.2.1 Literature Selection

A structured search in the management literature is performed in order to create a solid theoretical framework. This is done by selecting respected journals to search with selected keywords for state-of-the-art articles on the research subject. After this first search a selection of articles is read in order to select relevant references. Also by a forward search, articles that refer to the selected journals may be of relevance. All of the top journals are in the database of 'Web of Science'.

The first step is the selection of respected journals. This is done by looking into the rankings of management journals (Saunders 2001). The result is a top 15 of journals to search in, to narrow down the search.

During the second step the keywords are determined and articles are searched at the 'Web of Science'. This search is on articles published in the last 5 years. This is done for two reasons. The first reason is to cover the current state-of-the-art on the subject. Because research builds on earlier findings, the most important articles and findings published more than 5 years ago should be covered. The second reason is that a full search on all articles would be too time consuming. The search resulted into 114 articles. Based on a set of criteria relevant articles are selected for analysis. Based on the title and abstract the articles are evaluated on the following selection criteria. The result is a selection of 43 articles.

- The papers are written in English
- The study covers coordination and/or coordination mechanisms within organizations.
- The study setting has similarity in country/region (Europe / US) to the research setting.

The third step is a backwards reference search. By reviewing the citations for the articles identified in step two, prior articles that should be considered are found. This search results in another 47 articles with 18 articles matching the same selection criteria and that are available. This result of the literature selection is a set of 22 articles. These articles can be older than 5 years.

In the fourth step all these articles are imported into EndNote reference Software. This software makes it possible to perform a structured search into articles and other references. Of these articles not only the highly necessary reference data is entered, but also the type of article, keywords, a summary, the unit of analysis, and a label for quick reference.

In the fifth and final step the articles are all downloaded (where possible) and read. Unfortunately not all articles were available because of required subscriptions to journals or because it were (sections of) books not available in the library database. Another group of

articles that match the selection criteria based on the abstract are also removed from the sample, because the content does not match these criteria. Finally a group of 15 articles is selected for further analysis.

In the group of selected articles and books discussing coordination and/or coordination mechanisms the following table is an overview for comparison and analysis. The different rows display important aspects of the construct. The first is an overview of the type of coordination discussed in the article. The second shows the found coordination mechanisms. The third states the level of analysis. The following two rows state the findings of the research and the research methodology. We will use the measurements and operationalizations from other research to form measurement scales or criteria applicable to this research. In Appendix C an overview is given.

3.2.2 Coordination Mechanisms

Coordination means integrating or linking together different parts of an organization to accomplish a collective set of tasks (Ven et al. 1976). In a simplified model of coordination, an organization divides an overall problem into subtasks and assigns the parts to individuals. This produces efficiencies within each specialty, but gives need for cross-functional interaction and coordination. An organization that divides the parts of a computer program among programmers with similar skill must integrate the tasks that it originally divided. In the end, the modules of a computer program must work together as a single program, so the programmers who develop individual modules must integrate their efforts. The coordination problem becomes more complicated when organizations divide a task among (groups of) specialists. Specialization reduces the problem of bounded rationality because individuals or groups can concentrate on a component of the task that meets their unique skills, training, and abilities. Imagine an automobile firm that hires a variety of people with specialized skills – good engineers to design the transmission, skilled production people to manufacture the car, and effective marketers to sell it. Here the task of integration is even more complicated because the organization must integrate the efforts of specialists who speak different languages and perceive the world in different ways (Heath and Staudenmayer 2000). To facilitate coordination organizations rely on linkage devices and coordination mechanisms to integrate these autonomous and specialized structures (Olson et al. 1995). This is the meaning of coordination within the research, concerning interdepartmental collaboration.

Coordination mechanisms are often viewed as design tools that are used in addition to a firm's hierarchical reporting arrangements to increase coordination, communication, and decision making across organizational unit boundaries. For example, Galbraith (1994) argues that vertical reporting arrangements focus an organization on its key strategic demands, while horizontal mechanisms provide a more "lateral way of functioning." Thus, no matter which hierarchical structure a firm implements (centralized or decentralized), horizontal mechanisms can be used to help remove the barriers to cross-unit collaboration that are created by the firm's reporting arrangements (Brown 1999).

In our literature we find three different concepts of coordination and accommodating coordination mechanisms.

1. Organizational information processing theory
2. Coordination theory
3. Expertise coordination

The most common is the organizational information processing theory. We will discuss this theory in the following section. The two others are coordination theory and expertise coordination. Both are relatively new but show a different perspective on coordination. Both will be discussed in their own section. In the end an overview of the views on coordination

(and coordination mechanisms) will present clear differences and similarities. But first we start with the information processing theory.

Organizational Information Processing Theory

Most theories of coordination focuses on the need to balance differentiation among organizational units, with integration achieved through coordination mechanisms (Galbraith 1977, Lawrence and Lorsh 1967, Thompson 1967). Information processing theory states that increased information exchange is essential to overcome task uncertainty and task interdependence (complexity) faced by an organization (Andres and Zmud 2002; Tushman 1977). Complexity and uncertainty are driven partly by interdependencies among activities both within each department and between departments. Consequently, as intradepartmental or interdepartmental task interdependencies grows, the need for information- processing capacity at the department level increases (Tushman & Nadler, 1978). "Organizational effectiveness is greatest when the information processing capacities of the structure fit the information-processing requirements of the work" (Nadler & Tushman, 1997: 68).

Research models concerning coordination mechanisms are based on the assumption that certain modes or mechanisms are richer or more interactive. The theoretical trade-off is that the mechanisms that provide greater lateral information processing and coordination are more costly to implement. Direct contacts between managers afford only modest increases in information processing, but are a simple mechanism with low implementation costs. More costly are formal groups for temporary or ongoing problem-solving, such as ad hoc task forces or more permanent teams that have representatives from multiple units, and formal roles responsible for collaboration across different departments within an organization, such as lower-level liaison roles and full-time integrating managers. Matrix forms can be used to establish dual reporting relationships that ensure high levels of cross-unit collaboration and accountability, although at the highest organizational cost. (Brown 1999)

Literature on coordination mechanisms identifies several specific coordination mechanisms. Possible ways of classifying coordination include formal impersonal, formal interpersonal, and informal interpersonal (Brown 1999); non-coordination, standards, schedules and plans, mutual adjustment, and teams (Adler, 1995); coordination by programming and by feedback (March & Simon, 1958; Van de Ven et al., 1976); and coordination by standards, plans, and mutual adjustment (Thompson, 1967).

Galbraith's early conceptualization (1973) of the integrating manager role as a mechanism with high information processing capabilities is also shared by Mintzberg (1979) and Nadler and Tushman (1988). Daft (1992) endorses Galbraith's earlier distinctions between lower-level liaisons and full-time integrators, as well as between permanent teams and temporary task forces. However, Daft views permanent teams more capable of higher levels of coordination than full-time integrators, because teams are not dependent on the "people skills" of a single integrator. Daft also advocates the synergistic usage of multiple mechanisms, such as both full-time integrators and standing teams. Finally, a matrix form is modelled in the two earliest classifications as the design mechanism yielding the greatest benefits. In the two most recent classifications, however, Galbraith (1994) reconceptualises the matrix form as a structural device that establishes dual reporting arrangements for a given mechanism and does not include it as a separate type of mechanism.

Galbraith's (1994) most recent continuum is a simplified scheme of two formal structures (integrator roles, formal groups) and an "informal organization." Galbraith defines the informal organization in terms of non-structural design actions that promote voluntary, cooperative problem-solving across unit boundaries and can "provide a foundation" for the formal (structural) mechanisms. (Brown 1999)

Adler made a typology of coordination mechanisms for design/manufacturing integration. These mechanisms are categorized into non-coordination, standards, schedules and plans, mutual adjustment, and teams. Adler defined three phases in a design/manufacturing process: pre-project, product design, and manufacturing. Coordination mechanisms that are defined within the typology are: noncoordination, standards, schedules and plans, mutual adjustments, and teams. For each of the phases of the process different examples of coordination are found for each coordination mechanism.

Galbraith 1973: <i>Sequency of devices</i>	Nadler & Tushman 1988	Galbraith 1994	Adler 1995	Olson et al. 1995	Sabherwal 2003
Matrix Form	Matrix Organization	Integrator Roles	Teams	Design centers	Informal Coordination
Managerial linking	Integrating roles/departments	Formal groups	Mutual adjustment	Design teams	Formal Coordination
Integrating role	Cross-unit groups	Informal organization	Rules and Plans	Matrix structures	Plans
Team	Liaison		Standards	Integrating managers	Standards
Task Force			Noncoordination	Temporary task forces	
Liaison role				Individual liaisons	
Direct contact				Bureaucratic control	

Table 7: Coordination Mechanisms in Information Processing Theory

After considering these classifications, coordination mechanisms can be classified into five broad types—non-coordination, standards and rules, goals and plans, formal mutual adjustment, and informal mutual adjustment. This classification builds on the classifications used by Thompson (1967) and Adler (1995) by incorporating Kraut and Streeter's (1995) distinction between formal and informal mechanisms (Sabherwal and Rajiv 2003). Table 8 summarizes this classification scheme. The matrix form as modelled in the two left classifications was reconceptualised by Galbraith (1994) as a structural device that establishes dual reporting arrangements for a given mechanism. This is why it is not included it as a separate type of mechanism.

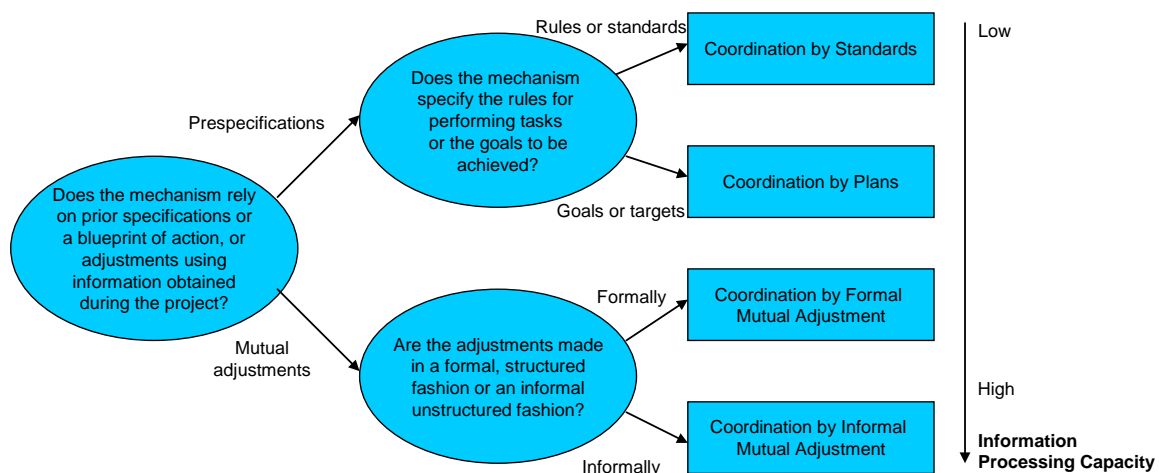


Table 8: The classification of coordination mechanisms. (Sabherwal, 2003)

Mechanisms that seek coordination through standards and plans rely on a priori specification of codified blueprints, action programs, or specific targets (March & Simon, 1958; Thompson, 1967). They are impersonal in nature as once they are implemented; their application does not require much verbal communication (Galbraith, 1974, 1977). These mechanisms generally have high fixed costs (for setting up the mechanism) but low variable costs (for each application of the mechanism).

In contrast, coordination mechanisms involving mutual adjustment use interpersonal interaction to make changes based on information obtained during the project (March & Simon, 1958; Thompson, 1967). Being more interactive in nature, they incur higher variable cost but lower fixed cost. Informal mutual adjustment differs from formal mutual adjustment in that the adjustments are made in a more structured and formalized fashion. Informal mutual adjustment may therefore be more related to team interdependence, while formal mutual adjustment may be more related to reciprocal interdependence. Also, informal mutual adjustment mechanisms would incur greater variable costs but lower fixed costs than mechanisms involving formal mutual adjustment.

Examples of Coordination Mechanisms (Adler 1995; Brown 1999; Crowston 1997; DeSanctis et al. 1994; Ven et al. 1976)

1. **Rules and Standards:** blueprints, system compatibility standards, data dictionaries, design rules, modification request procedures
2. **Goals and Plans:** procedures, planning, project plans, delivery schedules, project milestones, requirements specifications
3. **Formal Mutual Adjustments:** integrators, teams, cross-unit integrators, coordination committees, code inspections, design review meetings, liaison roles, reporting requirements, status review meetings
4. **Informal Mutual Adjustments:** co-location, informal meetings, joint development, transition teams, teambuilding, interdepartmental events

Figure 3: Examples of Coordination Mechanisms

Coordination Theory

Coordination theory is developed by Malone, Crowston and colleagues (1997; 1994). It is an interdisciplinary study on coordination (computer science, economics and operations research, organization theory) that emphasizes on the management of interdependencies among resources and activities. Different dependencies are defined and they all require different coordination mechanisms. Dependencies in processes and the generated coordination methods are recorded in libraries. According to coordination theory, tasks are allocated across organizational members, and communication and control mechanisms must facilitate the necessary information exchanges and decisional autonomy needed for effective collaboration and decision-making. Coordination theory can be used for analyzing, comparing and redesigning processes, and attempting to improve performance. Coordination problems because of interdependencies must be overcome by coordination mechanisms.

The dependencies in coordination theory are: Managing shared resources (including task assignments), managing producer / consumer relationships (including prerequisites and usability constraints), managing simultaneity constraints, managing task / subtask relationship.

By characterizing these various dependencies and focusing on the process level, a variety of coordination mechanisms can be identified and applied. Coordination theory focuses on group action (in team level). The interdependencies that are defined exist between individuals. Actors perform interdependent activities (tasks) to achieve goals. To achieve the goals, this may also require or create resources. There are three types of interdependencies, each with their own coordination mechanisms.

Task – Task dependence can mean that:

- Tasks share common output
- Tasks share common input
- Output of one task is input of other (prerequisite)

Task – Resource dependence exists when resources are required by a task

Resource – Resource dependence exists when one resource depends on another.

The coordination theory has been applied in a study by Crowston (1997) to research how task processes can be decomposed, documented, and altered to create new forms of organizing work. Crowston's research demonstrates the potential of coordination theory in the study of process redesign within a software change process of a large mini-computer manufacturer. The case presented does not formally test coordination theory, but is merely a 'proof of concept'.

Strength of coordination theory is its recognition of the complexity of interdependencies in organizational work. However, it shares with the information-processing view the assumption that the environment is predictable enough to characterize existing interdependencies and that predefined mechanisms can be designed for various contingencies (Faraj and Xiao 2006).

Expertise Coordination

Expertise coordination breaks with the assumption that the environment is predictable enough to characterize existing interdependencies. In organizations where the work process is dynamic and highly contextualized, and the environment is highly unpredictable, expertise coordination uses a different approach in the study of coordination. Teams must acquire and manage critical resources in order to accomplish their tasks. In knowledge teams the critical resources are skills and knowledge, here called expertise. But only the presence of expertise is not enough. The expertise must be managed and coordinated to produce high-quality work. Knowledge teams are interdisciplinary teams mainly consisting of experts with their own expertise. These teams must be able to know where expertise is located, is needed and where expertise is brought to bear. This is expertise coordination.

According to expertise coordination four related factors suggest the need to reconceptualise coordination and formulate this new paradigm.

1. Traditional coordination theory emphasizes the how (i.e., the mode) of coordination as opposed to the what (content) and when (circumstances) of coordination. Knowledge work requires the application of specialized skills and knowledge in a timely manner, thus raising difficult coordination issues in dynamic and time-constrained environments (Faraj and Sproull 2000).
2. Thompson's (1967) typology of interdependencies may be useful to describe necessary interunit or interorganizational linkages. However, it assumes that predetermined work patterns accurately reflect requisite interdependencies and, thus, is a less compelling frame for explicating interdependent knowledge work performed in interdisciplinary teams.

3. Organizations that face a high-velocity environment and must also operate essentially error free paradoxically emphasize both formal and improvised coordination mechanisms (e.g., Brown and Eisenhardt 1997, Weick and Roberts 1993).

4. Knowledge tends to be embedded in localized work practice and difficult to decontextualize. One implication is that coordination at the boundary may require transformation of knowledge (Bechky 2003). Because of differences in perspectives and interests, it becomes necessary to provide support for crossboundary knowledge transformation (Carlile 2002).

Two important points follow that set characterize expertise coordination. First, it recognizes that coordinated actions are performed within a specific context, among a specific set of actors, and following a history of previous actions and interactions that necessarily constrain future action. Second, following Strauss (1993), the authors emphasize trajectories to describe sequences of actions toward a goal. Trajectories differ from routines because of their progression towards a goal and attention to deviation from that goal. Routines only emphasize sequences of steps and, thus, are difficult to specify in work situations characterized by novelty, unpredictability, and ever-changing combinations of tasks, actors, and resources. Trajectories emphasize both the unfolding of action as well as the interactions that shape it. Within this paradigm, coordination is more about dealing with the “situation” than about formal organizational arrangements.

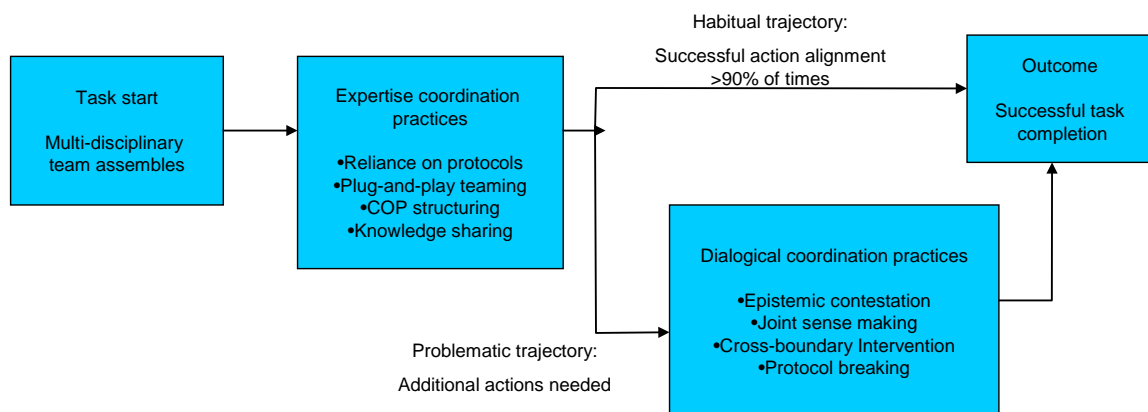


Figure 4: Coordination-Focused Model of Trauma Patient Treatment (Adler 1995; Faraj and Xiao 2006)

In an inductive study in a trauma setting scholars found two specific coordination strategies that ensure effective work outcomes (Faraj and Xiao 2006). The first category, which is called call expertise coordination practices, represents processes that make it possible to manage knowledge and skill interdependencies. These processes bring about fast response, superior reconfiguration, efficient knowledge sharing, and expertise vetting. Second, because of the rapidly unfolding tempo of treatment and the nature of the treatment trajectory, dialogic coordination practices are used as contextually and temporally situated responses to occasional exceptions, errors, and general threats to the patient. These dialogic coordination practices are crucial for ensuring effective coordination but often require contentious interactions across communities of practice.

The study of Faraj and Sproull (2000) shows that expertise coordination contributes to team performance above and beyond traditional factors such the use of administrative coordination. Also expertise coordination processes (recognizing where expertise is needed, knowing where expertise is located, and bringing expertise to bear) are positively related to team efficiency and effectiveness.

3.2.3 Summary

Following from the three coordination theories the following overview (Table 9) summarizes the important information related to these theories. First a description or definition of the theory is given. Then the level(s) of analysis by which studies did their research. The third row describes the coordination mechanisms found and the fourth row the type of organizations or situation in which the theory is applicable. The final row contains a short summary of the findings.

<i>Theory:</i>	Main Characteristics	Level of analysis	Coordination Mechanisms	Organization Application	/ Findings
Organizational Information Processing Theory	Coordination mechanisms have information processing capacities. This capacity must fit the level of interdependence and uncertainty	Multi-level (Group & Individual)	Informal Coordination Formal Coordination Plans Standards Non-coordination	Any Integration of differentiated units.	Increased Information Processing requires more organic and participative Coordination Mechanisms
Coordination Theory	Different dependencies require different coordination mechanisms. Dependencies in processes and the generated coordination methods are recorded in libraries	Individuals	Task vs Task Task vs Resource Resource vs Resource	Any Study New Organizational Forms Process (re)design	Little/none empirical evidence with findings.
Expertise Coordination	In knowledge work Teams must be able to know where expertise is located, is needed and where expertise is brought to bear.	Individuals	Expertise coordination: Dialogic coordination:	High velocity, error free organizations like trauma centres. Knowledge work. Interdisciplinary teams	Contributes to team performance above and beyond traditional factors (group resources, use of administrative coordination)

Table 9: Coordination Mechanisms in Coordination Theory

3.2.4 Conclusion

Within the context of this thesis we are most interested in the coordination mechanisms within (outsourced) IT Maintenance. Because of the interdepartmental coordination required information processing theory is in line with the research focus. Other factors in favour of the information processing theory are the immaturity of the other two theories, although expertise coordination and coordination theory have been used in studies mildly similar to our research context. Within expertise coordination theory knowledge teams are interdisciplinary. This is not (always) the case within our research context.

In our previous section, where we covered task interdependence we found that an individual level of analysis seems illogical. Both coordination theory and expertise coordination are applicable to an individual level. Information processing theory is used in different levels.

Measurements

We are interested in coordination mechanisms found information processing theory. Coordination mechanisms can be classified into five broad types—noncoordination, standards, plans, formal mutual adjustment, and informal mutual adjustment. This classification builds on the classifications used by Thompson (1967) and Adler (1995) by incorporating Kraut and Streeter's (1995) distinction between formal and informal mechanisms (Sabherwal and Rajiv 2003). Table 8 summarizes this classification scheme. Where most models lack informal mechanisms or rules and standards, or just focus on one type of coordination mechanism, this model stands out in completeness. And finally this model is build on other models and is the most current. The five (or four, since non-coordination means no coordination) coordination mechanisms are:

1. Non-coordination
2. Rules and Standards: blueprints, systems
3. Goals and Plans: procedures, planning, project plans
4. Formal Mutual Adjustments: integrators, teams
5. Informal Mutual Adjustments: training, collocation, teambuilding

In the research model the next box can be filled. This leaves only one box open. The one that cover the fit between task interdependence and coordination mechanisms for collaborative success.

3.3 Task interdependence and Coordination Mechanisms Fit

This chapter will discuss literature that describes or found a ‘fit’ between task interdependence and coordination mechanisms. Fit is a construct that is closely related to contingency theory. In short this means that one ‘thing’ depends on other ‘things’. The organization’s situation dictates the correct management approach (Daft 2001:609). The combination of things – in our case the level of task interdependence and used coordination mechanisms – influences organizational performance. A successful combination means there is a good fit. Although there is a relative decline in popularity of contingency theory, our current level of understanding of these issues is not yet adequate. (Adler 1995)

3.3.1 Literature selection

A search in the reference database that is formed in the previous sections led to a list of articles. The search into keywords and summary on each of the topics of which the main topic is at least one of these constructs. Also the articles must contain some sort of empirical evidence that supports the hypotheses or inferences in the literature. Table 10 shows this in a concept matrix (Webster and Watson 2002). We are most interested in the articles that show a relation between the constructs. These articles may help define and understand the fit between task interdependence and coordination mechanisms for interdepartmental collaboration success.

Author(s)	Concepts			Level of analysis
	Interdependence	Coordination	Success / Performance	
(Andres and Zmud 2002)	X	X	X	Individual
(Adler 1995)	X	X	X	Group
(Victor 1990)	X	X		Group
(Hoegl et al. 2004)	X	X	X	Group
(Ancona and Caldwell 1992)		X	X	Group
(Faraj and Sproull 2000)	X	X	X	Individual
(Gupta et al. 1986)	X	X		Group
(Olson et al. 1995)		X	X	Group
(Tushman 1977)	X	X	X	Group
(Sethi 2000:b)	X		X	Group
(Hoegl and Gemuenden 2001)		X	X	Individual
(Wageman 1995)	X		X	Individual
(Ven et al. 1976)	X	X		Group
(Thompson 1967)	X	X		Group

Table 10: Concept Matrix Overview

The articles in the matrix cover at least two of the constructs. In 14 articles a relation between at least two of the constructs are found. The matrix may give the impression that all constructs are comparable, but this is not the case. There are differences in definition, level of analysis and operationalization of the constructs. This has been covered in the previous sections. Also different sources describe different relations between the constructs.

3.3.2 Interdependence and coordination mechanisms fit

The current study has such a research direction by examining contingent relationships among coordination mechanisms and task interdependence in interdepartmental collaboration. As departments depend on other departments' input for accomplishing their task, the work in one department has implications for the work and progress in other departments. Therefore, technical details have to be synchronized and connected activities have to be well timed to meet the given schedule and budget constraints (Sabbagh 1996). Without effective coordination between the departments, interdependencies might produce mistakes necessitating rework and creating crises (Kazanjian et al. 2000). Departments need to identify their interfaces and interdependencies with other departments and initiate an appropriate amount of coordination (Hoegl et al. 2004).

In this chapter there is a difference made between continuous process and projects. Some researchers (Adler 1995; Hoegl et al. 2004) took an interest in changing coordination mechanisms and/or interdependencies during projects. Researchers who did not make this distinction will first be covered in the 'continuous process' paragraph.

Fit in continuous process

What are the appropriate coordination mechanisms in relation to the interdependence? The amount of coordination must fit the interdependence. Thompson (1967) makes two observations about interdependence and coordination. First, there are distinct parallels between the types of interdependence and the types of coordination. With pooled interdependence, coordination by standardization is appropriate; with sequential interdependence, coordination by plan is appropriate; and with reciprocal interdependence, coordination by mutual adjustment is called for. Second, the three types of coordination, in the order introduced above, place increasingly heavy burdens on communication on communication and decisions. Standardization requires less frequent decisions and a smaller volume of communication during a specific period of operations that does planning, and planning calls for less decision and communication activity than does mutual adjustment.

Thompson's theory (1967) only states which type of coordination is most appropriate, where Ven et al. (1976) research the distribution of coordination mechanisms. Table 11 shows that as task interdependence increases, there is an overall greater use of all coordination mechanisms combined (the grand mean). Further, the graph shows there are substantial increases in the use of all coordination mechanisms except impersonal rules and plans over the range from pooled to sequential to reciprocal work flows. Thus, the only significant exception to Thompson's "additive" hypothesis in the study is the decrease in predefined mechanisms between sequential and reciprocal workflows.

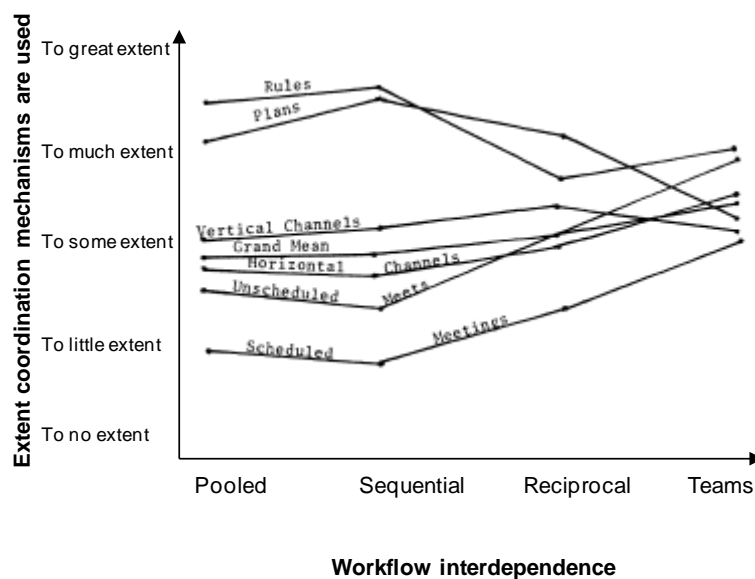


Table 11 Profile of Coordination Mechanisms on Types of Task Interdependence

Increasing task interdependence generates a requirement for higher frequency and volume of communication and decision-making between groups. If predefined coordination mechanisms are used with high task interdependence, information-processing capacity should be insufficient and task efficiency would decline. Alternatively, a mutual adjusting coordination mechanism provides a greater capacity to exchange and process information in a timely manner. Random, informal peer-oriented information exchange needed for task clarification, alignment, and integration results in superior productivity and quality. Mutually adjusting coordination under conditions of low task interdependence can overload the decision-making structure with information and unnecessary interactions, which can affect already effective tasks, consuming both time and effort. Instead, established task-related rules, procedures, and formal work plans that minimize involvement prove to be more efficient for low task interdependence (Andres and Zmud 2002; Crowston 1997).

Gupta et al. (1986) suggest that a number of situational factors —such as a complex and turbulent external environment or an aggressive product/market development strategy— make the functional departments of a business more dependent on one another for the expertise, information, and other resources needed to perform their jobs. Increasing interdependence, in turn, increases both the desired flow of information and other resources and the levels of conflict among those departments. Consequently, more organic and participative coordination structures are needed to facilitate resource flows and resolve conflicts effectively as the interdependence between departments increases. Siggelkow and Rivkin (2006) found that in the presence of high intradepartmental and interdepartmental task interdependence, a higher level of information-processing capacity at the departmental level improves organizational performance.

Fit in projects

In contrast with the relative stability of interdepartmental collaboration in ongoing operations, coordination tasks and mechanisms typically change over the course of a project. The studies of Hoegl et al. (2004) and Adler (1995) study these constructs in relation to different project phases. As the findings of Hoegl et al. (2004) document, collaboration both within teams and between teams in the early project phases has impact on later performance. Thus, assessing and managing variables as interteam coordination (task interdependence and

changes in the process) early on in the project helps identify and counteract problems long before financial and project-controlling instruments detect them. Interteam coordination is particularly critical for teams that have technical interfaces with a high number of other teams (i.e., high task interdependence) (Hoegl et al. 2004). For those teams, interteam coordination is crucial in the early project phases and remains important during the middle phase of the project. This is consistent with the study of Ancona (1990), who found that teams depending on outsiders and facing new, unstructured tasks were rated as the highest performers if they emphasized on. Teams with low task interdependencies, by contrast, are less dependent on interteam coordination to ensure team performance.

In the work of Adler (1995) he presents hypotheses concerning the choice of coordination mechanisms in product design project. He proposes two hypothesis. *“The higher the degree of novelty, the closer to the team end of the spectrum the coordination mechanisms should be”* and *“the lower the analyzability of the product/process fit problem, the greater should be the share of later phases in the overall coordination effort.”* Novelty depends on the organizations experience with the design of a specific product. The product/process fit problem is the difficulty of the search for an acceptable solution to a problem to produce designed product. The phases defined are pre-project, design and manufacturing.

The key variable used in this analysis is the "cost of producibility" (COP) which is defined as the cost of quality: the total costs of preventing, assessing and correcting producibility problems. In the case of producibility, the key costs are (a) organizational costs in the time required to coordinate between the functions, (b) costs in redesigning the product or process, and cancelling or reordering components and equipment, and (c) opportunity costs in the income foregone by being later to market if producibility assurance should delay shipments (see Krubasik 1988). The COP of the coordination mechanisms are measured primarily in time (a), the COP associated with relying on different phases are measured primarily in the costs of redesign (b), the costs of reordering equipment and components(b), and time-to-market opportunity costs (c).

The assumption underlying the proposed cost/benefit analysis is that an organization should choose the coordination mechanism that minimizes the cost of producibility while assuring an acceptable level of producibility. This is visualized in Figure 5. If the novelty of the project is low, the COP will be at its minimum when the organization relies on standards, and COP will be successively greater if the organization uses plans, mutual adjustment, or teams. (Although the four modes are conceptualized as categorical, the author has taken the liberty of drawing continuous lines to simplify the graphics.) In the case of a project with low fit novelty (AA), this optimal coordination mechanism is standards, and use of more elaborate mechanisms would be wasteful "over-coordination."

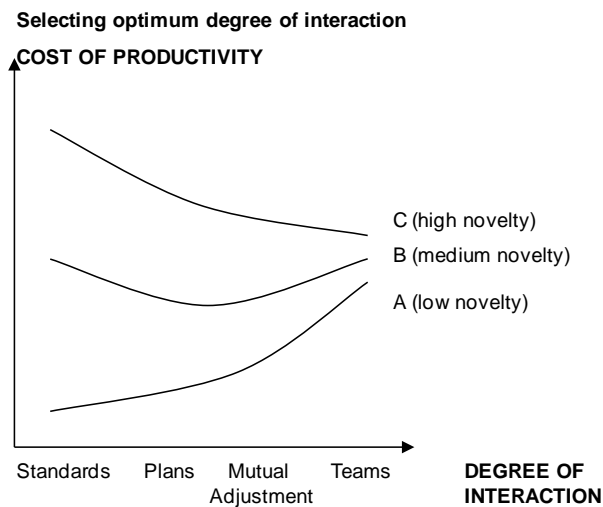


Figure 5: Selecting the optimum coordination mechanism

For the other dimension, the same general logic can be applied (see Figure 6). Curve AA in Figure 6 shows the COP associated with the different phases in the ease of a project with a very high level of product/process fit analyzability. When the fit issues are very easy to analyze, the organization should be able to develop proven compatible capabilities in advance of the project, and product development should be cheap and fast, relying on low cost standards mechanism in the design and manufacturing phases. Design-phase teamwork is costly over-coordination when fit could have been assured by standards that were developed in the pre-project phase. And if the organization leaves until the manufacturing phase the resolution of fit issues that could have been resolved earlier, time-to-market and development costs will suffer further.

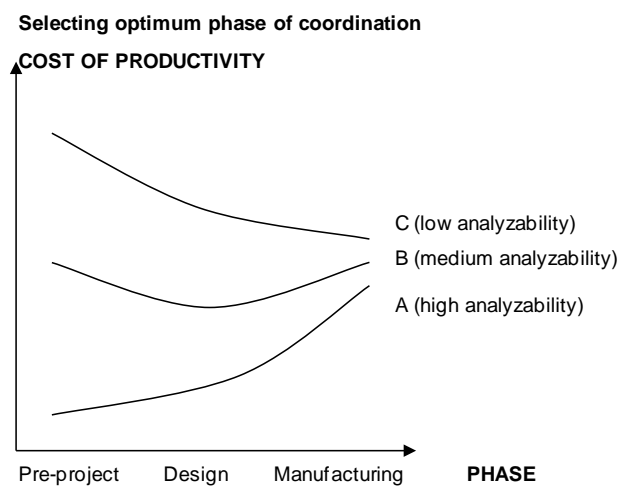


Figure 6: Selecting the optimal phase of coordination

3.3.3 Summary

The research of Thompson (1967) shows that each level of task interdependency fits with a particular coordination mechanism. A low level of task interdependence, for instance pooled, requires a low level of information processing like rules and standards (Figure 7). Increasing task interdependence generates a requirement for a higher level of information processing and thereby a higher frequency and volume of communication and decision-making. This

requires other coordination mechanisms like mutual adjustment in either a formal or informal way, that can facilitate these higher frequencies and volumes.

The following figure prescribes the main coordination mechanism at each level of task interdependence.

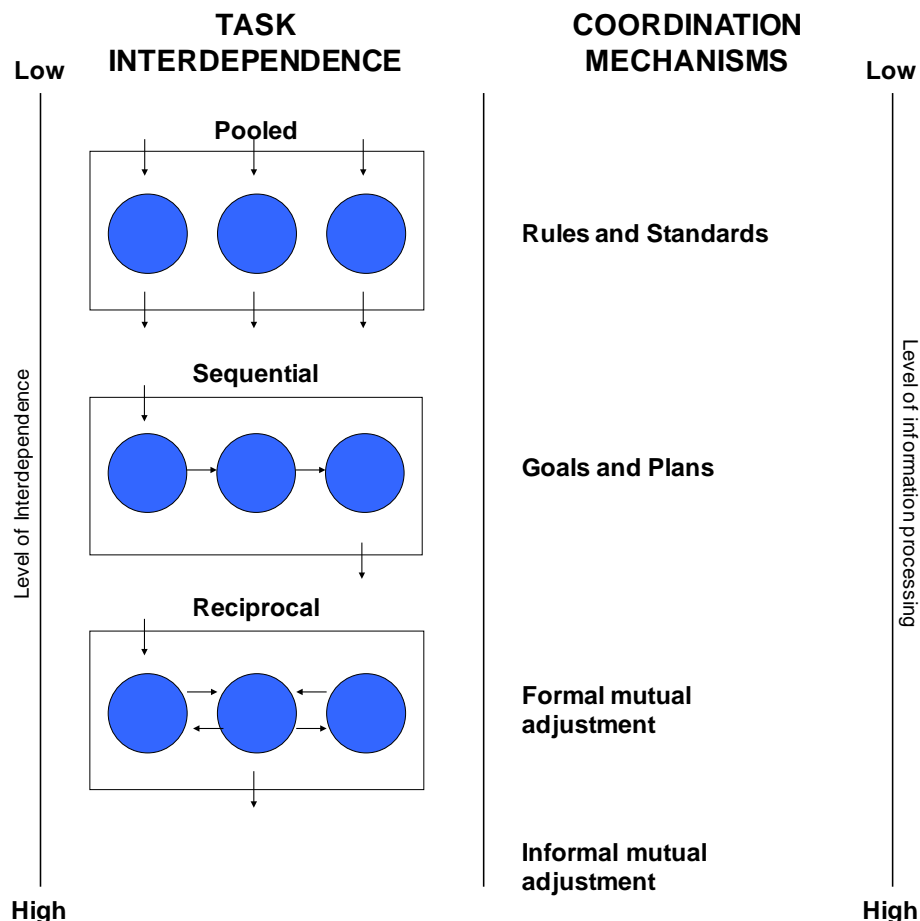


Figure 7: Task interdependence and Coordination Mechanisms

Both Ven et al. (1976) and Adler (1995) show that all of the coordination mechanisms are always to some extent present within each type of task interdependence. This means that the best fitting coordination mechanism is present, next to the other mechanisms. Hoegl et al. (2004) and Adler (1995) also recognise that different coordination mechanisms are being used for each phase of a project. Within a pre-project phase there is a higher level of information processing required, which can prevent a lot of rework and reconciling during the project.

3.3.4 Conclusion

If the level of task interdependence increases, there is need for a higher level of information processing. Although Both Ven et al. (1976) and Adler (1995) have shown that all the mechanisms are always present, and can differ between each phase of a project (Hoegl et al. and Adler). Within this research we will therefore measure each of the coordination mechanisms instead of just naming the most dominant one. Each of the present mechanism is important in order to analyse projects within different situation.

3.4 Collaboration Success

In the previous paragraph the fit of task interdependence and coordination mechanisms has been covered. A fit of constructs should lead to good performance ratings. These good ratings or outcome we call collaboration success.

To assess whether a good fit between task interdependence and coordination mechanisms will result in collaboration success, research that had a similar structure is discussed. From our selection of articles in 3.3 the articles discussing performance are put in Table 12: Performance measures. It shows the outcome measures, with the unit of analysis and the type of measure and whether the articles cover subjective or objective measures.

As with the earlier paragraphs the unit of analysis is an important differentiator between the articles. Is the outcome of a collaborative effort defined as the sum of all parts? In this case the unit of analysis is the group. Or is the outcome taken as a joined effort? Then the unit of analysis is the organization.

Author/Date	Performance measure	Unit of Analysis	Type of measure
(Adler 1995)	Cost of Producibility <ul style="list-style-type: none"> • Coordination costs • Costs of redesign • Opportunity costs 	Organization	Objective
(Ancona and Caldwell 1992)	efficiency, quality, adherence to schedules, adherence to budgets, ability to solve conflicts	Groups	Subjective
(Andres and Zmud 2002)	Software development success <ul style="list-style-type: none"> • Team Productivity • Process Satisfaction 	Groups	Subjective
(Faraj and Sproull 2000)	Team performance <ul style="list-style-type: none"> • Team effectiveness • Team efficiency 	Groups	Subjective
(Hoegl and Gemuenden 2001)	Team performance: effectiveness and efficiency	Groups	Subjective
(Hoegl et al. 2004)	Team performance: quality, schedule (time), budget (cost) objectives	Groups	Subjective
(Olson et al. 1995)	Product and financial Timelines and efficiency Psychological	Organization	Subjective
Sethi 2000:b	Super ordinate identity New product Performance <ul style="list-style-type: none"> • Sales • Market Share • Profit 	Organization	Objective
Tushman, 1977	R&D Project Performance	Groups	Subjective
Wageman, 1995	Group Effectiveness <ul style="list-style-type: none"> • Degree of interaction, learning and norms • Motivation & satisfaction 	Groups	Subjective

Table 12: Performance measures

In the following paragraphs the performance measures are elaborated, grouped by the unit of analysis. First the group level and then the organizational level.

3.4.1 Group level

Studies from Ancona and Caldwell (1992), Faraj and Sproull (2000) and Hoegl et al. (2004) take the group level (or team level) as unit of analysis.

The research of Ancona and Caldwell (1992) focuses primarily on those team behaviors that are directed outward, using an “external” perspective. They follow the stakeholder view of organizations in assessing team performance. They use subjective ratings of performance, from multiple sources. Top division managers were asked to assess the teams on efficiency, quality, adherence to schedules, adherence to budgets, and ability to solve conflicts. While more objective ratings have been suggested, the experience of the authors is that these numbers are often interpreted through subjective lenses, are influenced by numerous external factors not under the control of the team or organization, and are less important than managerial ratings in performance evaluations. Group researchers have found a lag effect between group process and performance (Ancona 1990). This suggests that processes at time 1 may affect performance at time 1 or time 2. This means that certain processes may have a positive effect in the short term but turn out to be negative over time.

Faraj and Sproull (2000) measure team performance as team effectiveness and efficiency. This is measured subjectively. Objective productivity measures – such as lines of code per person per month – are often unavailable, are subject to manipulation, and may reflect the specific accounting practices of a site rather than an actual performance. Further, using objective measures assumes comparability across software projects, does not control for difference between projects or unique situational constraints, and thus raises a new set of methodological, and measurement issues. Thus, they relied on expert judgment as a better source of performance data. The other dimension of performance that software teams are measured on is efficiency, which is measured by the team’s adherence to schedules and budgets.

Hoegl et al. (2004) are studying interteam coordination in Multiteam R&D Projects. Here the unit of analysis is the team as they assess team performance. Team performance is defined as “*the extent to which a team is able to meet established objectives*”. In product development projects, specific dimensions of team performance include the adherence to predefined quality, schedule (time), and budget (cost) objectives. In the context of the study of Hoegl, quality refers to certain desired properties of the output produced by the team. Adherence to budget objectives refers to the costs associated with the team’s development activities. As for schedule objectives, all teams in a multiteam project are included in an overall sequence of milestones (design reviews, and so on) where certain deliverables are expected at predefined times, which, in turn, provide necessary input for other teams.

This study investigated how processes at the team and the interteam level influence the performance of teams in a large-scale, multiteam innovation project. Of the detailed performance measures, only adherence to schedule shows a significant positive relationship. Quality is not influenced by interteam coordination, and adherence to budget is negatively associated with interteam coordination. It is possible that the negative influence of interteam coordination on adherence to budget reflects the resource consuming nature of interteam coordination. This finding may offer support to earlier research (Tushman 1977, Clark and Fujimoto 1991, Loch and Terwiesch 1998).

3.4.2 Organizational level

Studies from Adler (1995) and Olson et al.(1995) take the organizational level as unit of analysis.

In the study of Adler (1995) the key performance measure is the "cost of producibility" (COP), which can be defined as: the total costs of preventing, assessing and correcting producibility problems. In the case of producibility, the key costs are (a) organizational costs in the time required to coordinate between the functions, (b) redesign costs (c) opportunity costs.

Olson et al. (1995) define performance as a combination of product and financial outcomes, timeliness and efficiency outcomes, and psychosocial outcomes. The performance of a new product development project include whether the resulting product meets management's expectations concerning (1) desired product quality and design standards, (2) sales objectives, and (3) the time required to reach break even. Another set of performance dimensions that has become increasingly important in these days of tight resources and rapid environmental change concerns the efficiency of the development process (within budget, completed in a timely manner). From a human resources perspective, the attitudes of functional participants in a development project are also relevant outcomes. These attitudes include each participant's satisfaction with the project's outcomes, the degree to which participants believe they made substantial individual contributions to the project, and each participant's assessment of his or her home department's performance within the project.

3.4.3 Direct effects of coordination mechanisms on performance

Apart from indirect effects of coordination mechanisms via the fit, some research has found direct effects of coordination mechanisms on performance. New product design projects in the study of Olson et al. (1995) found direct effects. Also the study of Hoegl et al. (2004) shows similar results. The use of either a large number of coordination mechanisms or a broader range of mechanisms leads to greater complexity and the involvement of larger numbers of managers in the development process. Such complexity can result in unavoidable delays in making decisions and moving the project forward. In this sense, the number and variability of mechanisms employed to coordinate a project both appear to affect the length of time needed to accomplish the process. These relationships are consistent with the view that a larger number and broader range of coordination mechanisms tend to involve more managers and incorporate a broader set of ideas and expertise, thus encouraging the development of a higher quality product. This broader involvement also appears to result in higher levels of participant satisfaction with the process. The number of different coordination mechanisms used was significantly negatively related to the product's design quality.

3.4.4 Summary

The positive influence of coordination of highly interdependent groups or departments on the effectiveness of projects has been repeatedly confirmed in the literature (Hoegl et al. 2004; Ruekert et al. 1987). Tushman (1977) shows that high levels of external interaction are necessary to successfully fulfil tasks with high interdependence. The study of Ancona and Caldwell (1992) reveals similar results: coordination with other teams positively influences the quality of the team's output. As such, coordination offers the opportunity of exchanges with experts from other teams, where new perspectives and alternative ideas enter the team (Sethi 2000a). This is critical for the overall effectiveness of the contract.

Summarizing there are three common components found in the literature: effectiveness, efficiency and psychological factors.

Effectiveness: quality, schedule (time), budget (cost) objectives

Efficiency: the optimal use of resources. Adherence to budget, adherence to schedules (use of resources).

Psychological: process satisfaction, motivation

At the group level this is in most cases team performance. At the organizational level we found the same components for performance. With the exception of Adler's Cost of Producibility for new product design.

These are often measured subjective by conducting interview, or by using surveys. The measurement is used as both organizational performance and team performance ratings. While more objective ratings have been suggested, these ratings are often interpreted through subjective lenses, are influenced by numerous external factors not under the control of the team or organization, and are less important than managerial ratings in performance evaluations.

A direct effect of coordination mechanisms and collaboration success has been found. Either a large number of coordination mechanisms or a broader range of mechanisms leads to a lower product quality but higher levels of participant satisfaction with the process.

3.5 Final Research Framework

Our final research framework covers our main findings from theory. Each construct is broken down in various attributes. A short summary of the findings, together with the research model and proposed outcomes will conclude this theoretical framework.

3.5.1 Task Interdependence

The definition that is the ground for our definition is found in the article of Hoegl et al. (2004) which is a definition of Gerwin and Moffat (1997, p301), which finds its origin in the work of Thompson (1967).

Task Interdependence: Refers to the intensity and direction of a workflow (or decision making) relationship.

The two main components 'intensity' and 'direction' find their origin in respectively Gerwin and Moffat (1997) and Thompson (1967). To extent the actual working, a third factor 'decision making' is added from Hrebiniak (1974).

1. Intensity of workflow
2. Direction of workflow (pooled, sequential, reciprocal)
3. Level of shared decision making

We will divide the level of task interdependence into four levels. Low, medium high and very high. Leading for this division is the classification of Thompson (1967) and Ven et al. (1976). The intensity of workflow and level of shared decision making are moderators to the division.

3.5.2 Coordination Mechanisms

Coordination: Integrating or linking together different parts of an organization to accomplish a collective set of tasks. In a simplified model of coordination, an overall problem is divided into subtasks and the parts are assigned to individuals. Coordination mechanisms are the mechanisms that integrate or link these subtasks. The classification of coordination mechanisms is adopted from the classification of Sabherwal (2003). We add non-coordination from Adler (1995), because this will reveal tasks or activities that may require coordination.

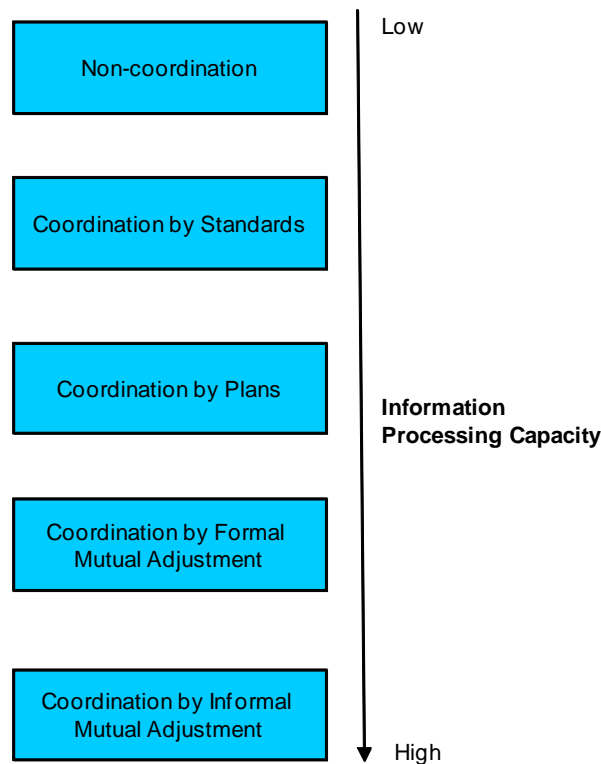


Table 13: The classification of coordination mechanisms. Adopted from Sabherwal (2003)

We divide the use of coordination mechanisms into three levels. Low, medium and high. When a type or coordination mechanism is not called, we will also be interested. Table 14 shows which criteria correspond to the level of use of a certain coordination.

0	No	Not called
1	Low	Low number and Low amount
2	Medium	High number and Low amount Low number and High amount
3	High	High number and High amount

Table 14: levels of use of coordination mechanisms

3.5.3 Fit of Constructs

According to Thompson (1967), a higher level of information processing is required in cases where a higher level of task interdependence is present.

- For low task interdependence the main coordination mechanism is rules/standards.
- For medium task interdependence the main coordination mechanism is goals/plans.
- For high task interdependence the main coordination mechanism is formal mutual adjustment.
- For very high task interdependence the main coordination mechanism is informal mutual adjustment.

Adding on Thompson his study, both Ven et al. (1976) and Adler (1995) conclude that each of the coordination mechanisms is always present, and that task interdependence does not fit exclusive to one coordination mechanism, but to a combination of coordination mechanisms. We will therefore measure each of the coordination mechanisms within our research cases.

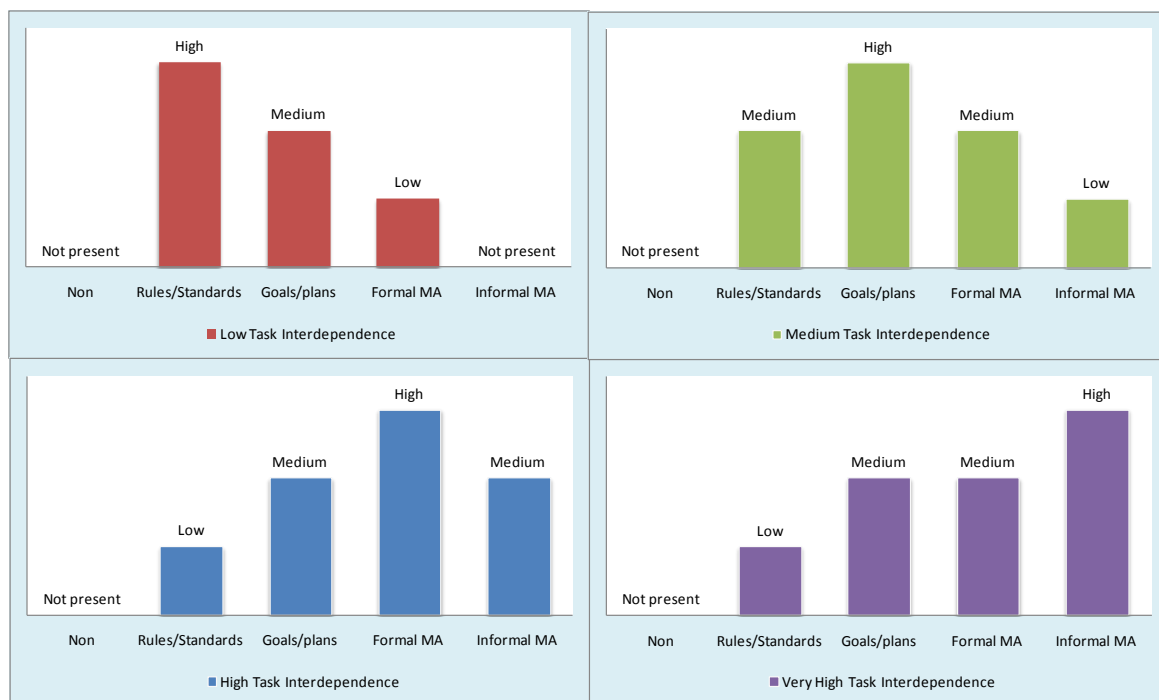


Figure 8: Assumed fit of task interdependence and coordination mechanisms

Our assumed combination of coordination mechanisms is illustrated in Figure 8. The main coordination mechanism is high with the coordination mechanisms round the main one assuming to be medium. Non-coordination should never be present, because interdependent tasks always require some form of coordination.

3.5.4 Collaboration Success

A fit of constructs should lead to good performance ratings. These good ratings or outcome we call collaboration success. Collaboration success in interdepartmental collaboration there can be divided into three components: effectiveness, efficiency and satisfaction.

Effectiveness is the performance indicator regarding meeting expectations of quality (outcomes). Common expressions are profit, customer satisfaction, or product quality.

Efficiency is the performance indicator regarding the optimal use of resources. Common expressions are the adherence to budget and adherence to schedules. Both are also coordination mechanisms. To avoid mixing up we do not put efficiency in the final model. The adherence to budgets and schedules will in the end be part of the effectiveness. When not adhering to budget, there will be no or lower profit. And when the service is not according to schedule, the customer will be unhappy resulting in lower effectiveness.

Employee satisfaction is the performance indicator regarding the wellness of personnel. Common expressions are personal success and learning.

We assume that fit is positively related to both effectiveness and employee satisfaction.

Also a direct effect of coordination mechanisms and collaboration success has been found. Either a large number of coordination mechanisms or a broader range of mechanisms leads to a lower product quality but higher levels of participant satisfaction with the process.

3.5.5 Research framework

These four sections bring us to the research framework. The level of task interdependence and coordination mechanisms have a contingent relation. Based on this contingency the fit is determined. This fit will result in collaboration success.

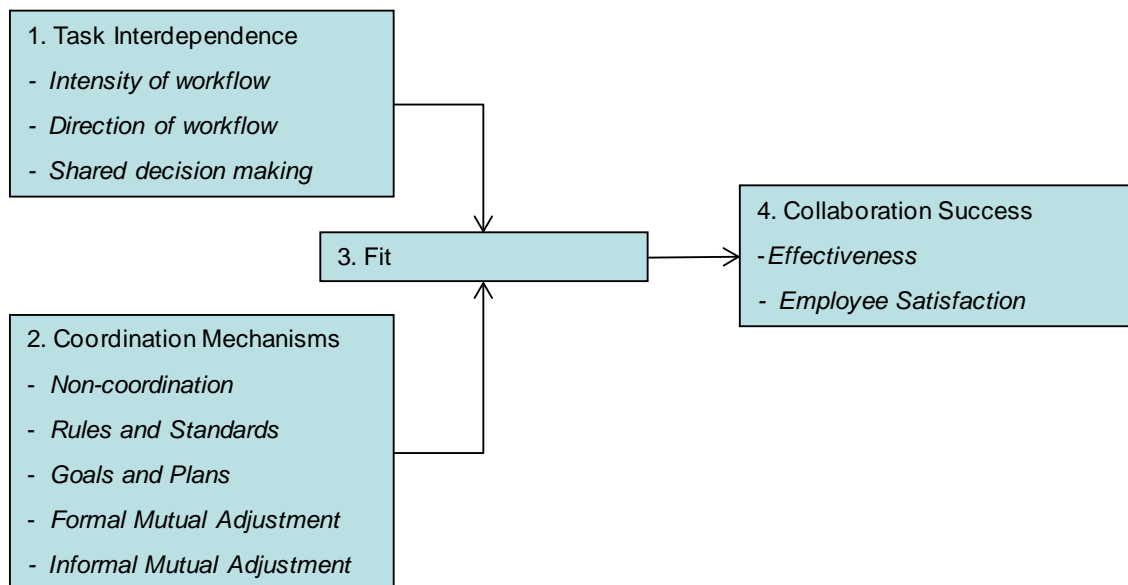


Figure 9: Final research framework

For each task interdependence the use of coordination mechanisms is represented in 3.5.3. Together with the collaboration success we formulated the following four scenario's. One for each level of task interdependence.

Scenario's

Scenario 1: In the scenario of both low task interdependence and high use of rules and standards, medium use of goals and plans, low use of formal mutual adjusting coordination mechanisms, and no informal mutual adjusting coordination mechanisms, we expect effectiveness and employee satisfaction will be high.

Scenario 2: In the scenario of medium task interdependence, we expect medium use of rules and standards, high use of goals and plans, medium use of formal mutual adjusting coordination mechanisms, and low use of informal mutual adjusting coordination mechanisms, we expect effectiveness and employee satisfaction will be high.

Scenario 3: In the scenario of high task interdependence, we expect low use of rules and standards, medium use of goals and plans, high use of formal mutual adjusting coordination mechanisms, and medium use of informal mutual adjusting coordination mechanisms, we expect effectiveness and employee satisfaction will be high.

Scenario 4: In the scenario of very high task interdependence, and low use of rules and standards, medium use of goals and plans, medium use of formal mutual adjusting coordination mechanisms, and high use of informal mutual adjusting coordination mechanisms, we expect effectiveness and employee satisfaction will be high.

4. Research Method

In the previous chapter we formed a conceptual framework. In this chapter we discuss the collection of the data and the analysis of the data.

4.1 Data Collection

To understand the fit between task interdependence and coordination mechanisms, a number of contracts is examined.

There is a limited number of collaborative contracts within the research organization. We explored the situation and learned for current and future contracts.

Given the lack of prior research on the collaboration between departments in outsourcing organizations, and our interest in studying this within the organizational contexts, a qualitative approach was considered appropriate. In order to identify a variety of task interdependencies and coordination mechanisms were analyzed in relation to each other.

4.1.1 Case Study Research

The most appropriate research method to refine our conceptual framework formed in the previous chapter should cover a different number of projects and give an in-depth view of the collaboration. We used case studies. We analyzed the emerging reality of the cases by our conceptual framework that has been build out of the literature review. This is similar to the study of (Sabherwal and Rajiv 2003) and (Brown 1999).

Case study research is very common in social science and business research. Case studies are often qualitative, but can also contain quantitative data in a mix. Yin (2003) had defined a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context. Scholz and Tietje (2002) define a case study as “an empirical inquiry that investigates a contemporary problem within its real-life context”. Case study research may contain only one case, but may contain multiple cases of which we make cross-case comparisons.

According to Yin (2003) five components are important for case study research: Research questions (chapter 2), propositions (if any) (chapter 3), selection of cases and unit of analysis (chapter 4), logic linking data to findings (chapter 5), and criteria for interpreting the findings (chapter 6). These five components provide a framework for carrying out case studies:

- Research questions
- Using Literature
- *Selecting and bounding case(s)*
- *Designing the study → Case study protocol*
- *Considering issues of validity and reliability*
- *Collecting data*
- *Analyzing data*
- Integrating study findings
- Interpreting findings and drawing conclusions

The research questions are stated in chapter 2 and the literature review is found in chapter three. In this chapter the bold and italic bullet points are covered. The following chapters (five and six) cover the remaining bullet points. The next step is that of selecting and bounding the cases.

4.1.2 Selecting the cases

Because collaboration is only a part of the success of a contract, and is hard to decontextualize, this thesis had a qualitative approach. This way we could put focus on the collaborative tasks and processes. By using multiple cases we got richer data and it helped us understand the use of coordination mechanisms under diverse interdependencies but in a comparable organizational context.

The unit of analysis equals cases in case study research. Because the study was considering collaboration of several groups combined, a study on the level of a contract is followed. With contracts the delivery of pre-defined services (in an agreement) to one client are meant. We chose to analyze contracts because we expect that within each contract there is a different 'amount' of collaboration, made more specific as the level of task interdependence. It is this collaboration between the teams of both departments that had our interest. Also the combination of coordination mechanisms in these contracts were expected to be unique for every contract. Within these contracts teams of both departments deliver a shared service to the customer. The type of interdependencies between the teams has earlier been illustrated in Table 6. This is the Team Level: Interdependence between inter- and intra-departmental teams. The reason we chose to analyze contracts instead of individual teams, is that the complex situation of interdependencies and coordination between teams will be left out while exploring it on a team level.

A collection of all shared contracts resulted into a list of eight. With a total of eight collaborative contracts we sampled for cases. Within these cases we defined Transition projects (3) and Service Delivery contracts (5). In accordance with IT Outsourcing three contracts were identified to explore the model. Two (just ended) transition projects (case A, case B) and a long term service delivery (case C) were studied as separate cases. Both were thought appropriate because of the following reasons. They have a fairly large amount of collaborative tasks and cover a variety of specialized teams. On the other hand these contracts have clear differences. Case A and B cover a short term highly unpredictable transition. Case A en B differ in terms of end-responsibility to the customer. Case A is mainly an IM contract and Case B mainly an AM contract. Case C covers a standardized long term contract where both practices play an important role.

In the case study we collected retrospective data on the cases. The transitions were just finished. Case C, the ongoing service delivery contract was still 'active'. In all cases we focussed on the last year.

The three main business processes for IT Outsourcing

1. Sales

The work that IT Outsourcing performs is the management of applications and infrastructure. The steps we find before the actual management can be done are the sales and the transition.

2. Transition

The transition is a project in which running services are taken over by IT Outsourcing. This may include knowledge transfer about applications and/or infrastructure, transfer of personnel that must be embedded into the organization, and transferring or even building new applications or infrastructure. Also clients processes need to be altered or implemented in order to connect IT Outsourcing to the client organization.

3. Service Delivery

When all this is completed the Service Delivery phase is started. This is the continuous maintenance and management of applications and/or infrastructure.

4.1.3 Sampling within cases

Now that we have selected the cases we wanted to sample for respondents within the case. We have chosen to select the internal key players within the contracts. With this we mean managers and coordinators. They represented teams of both departments and have an overview on the general developments within a contract. The management also had an important role in the decision of the used coordination mechanisms, so we could evaluate on the rationale behind them.

We found a variety of management and coordinating staff we interviewed. What their role and task was, can be found in the following overview:

- Service Manager (SM) is budget responsible for (a part of) the contract. He is the main contact for the Client and is the internal principal.
- Delivery Manager (DM) is concerned with the delivery of personnel. Find the right person for the right job in efficient way. Keep the factory running
- Transition Manager (TM) is overall responsible for a transition project.
- Service Coordinator (SC) of AM is team leader for development team. Coordinates inside a team and reports to the SM and DM.
- Service Coordinator (SC) of IM is more an assistant to the SM and in that way different then the Service Coordinator AM.
- Project Manager (PM) is similar to a transition manager. But these projects are running during service delivery and are most of the time smaller in size/budget.

Not all roles are represented in transitions or during service delivery. Within transitions the transition manager(s) and service manager(s) are the managing part of the project. These are in case A accompanied with a delivery manager and in case B with a project manager. For the service delivery service managers, delivery managers and service coordinators are managing the process. Project managers, together with the other management is responsible for the projects during service delivery. The goal was to interview every key informant for each case. In the following overview the respondents that we interviewed for each case are displayed. The value AM or IM states from what department they were part of.

Case	SM	DM	TM	SC	PM
A	AM/IM	AM	IM		
B	AM/IM		AM		IM
C	AM/IM			AM/AM/IM	

Table 15: Respondents

4.1.4 Case Study Protocol

In total we held 13 interviews of about 1 hour. These were semi-structured interviews that followed a fixed protocol. The interviews were held in the company by the researcher with the knowledge of the theoretical framework.

The protocol was formed out of the theoretical framework where our study shows interest in:

1. the factors influencing task interdependence
2. the coordination mechanisms in use
3. a contingent relation between task interdependence and coordination mechanisms
4. the success of contracts in terms of effectiveness and satisfaction

This is taken from the theoretical framework. The variables we formed out of the constructs were translated into a semi-structured interview protocol (Appendix B and C). In the protocol we started with a introduction of our research. Our first questions were concerned with the person sitting on the other end of the table (question 1) and a classification and background of the case (2). The following three questions came from the enumeration from the start of this section.

Like Ancona and Caldwell (1992) we used subjective ratings of performance or success in our last question. Objective numbers are often interpreted through subjective lenses, are influenced by numerous external factors not under the control of the team or organization, and are less important than managerial ratings in performance evaluations. For effectiveness, IT Outsourcing used a standardized OTACE-score (On Time At Customer Expectation). This was a five-point scale, with 1 being the lowest and 5 being the highest score. Within IT Outsourcing, a minimal OTACE-score of 3 at every project is being the minimum target. This OTACE-score was taken into consideration.

The interviews were recorded on a voice recorder when the respondent approved. Otherwise the conversations were recorded as notes on paper. After the interview a transcription was made for further analysis.

4.2 Data Analysis

The assumed fit of task interdependence and coordination mechanisms, as found in the graphics in 3.4 can be compared to the actual level of task interdependence and used coordination mechanisms found in the cases. After this the level of fit could be determined. Then the success of the cases had to be established, to finally compare the success with the level of fit. This was done by coding the transcription of the interviews. The transcripts were coded by highlighting all the tasks, coordination mechanisms and expressions of performance that were brought up during the interviews. We did not look for new codes or constructs, but followed the codes and constructs of the theoretical framework that are also present in the structure of the interviews.

First the tasks were coded by highlighting all the tasks and subtasks in every interview. Then we looked for overlapping tasks. We finally came up with a list of tasks. The task interdependencies were coded based on our theoretical framework. Interdependent tasks were coded in terms of: intensity, direction, and shared decision making. They were also coded in terms of the tasks we started with. The results were put together and items were scored individually. Together they made up for the level of task interdependence based on our classification in 3.4.

For coordination mechanisms a similar approach was followed. The coordination mechanisms were coded according to the five categories: non-coordination, standards, rules and plans, formal mutual adjustments, and informal mutual adjustments. Coordination mechanisms were also coded to what task they were referring. The same codes were put together and scored. This scoring was based on 3.4. 0-3 No – High. The results are represented again in the following table.

0	No	Not called
1	Low	Low number and Low amount
2	Medium	High number and Low amount Low number and High amount
3	High	High number and High amount

With the level of task interdependence and the intensity of used coordination mechanisms a graphical representation was made, similar to the one in 3.4. By comparing our assumed use of coordination mechanisms for the level of task interdependence with the results the level of fit has been assessed.

Following the same path as task interdependence and coordination mechanisms success in terms of effectiveness and satisfaction were coded in terms of the level and the task. Then they were put together and scored low, medium or high

5. Results

In the previous chapter the outline is set by which the data was collected. Also the method of analyzing the data was outlined. In this chapter the results are presented in following the predefined path. First the three cases are quickly discussed with a short summary. The results for each part are presented. First task interdependence, then coordination mechanisms. These two combined are presented in graphs and compared the assumed fit as presented in chapter 3. Then the success of the contracts are given. Finally the level of fit and the success of the contracts are compared.

5.1 Case Summaries

5.1.1 Case A

The first case describes a transition for a government agency. IM is client facing which means that IM maintains the contact with the client. IM pulls the project, and AM follows. The project ran from February until December 2007. The original deadline was July 2007, but this was delayed. The client was responsible for maintaining the IT function during the transition. The transition included the entire IT landscape of front-end, back-end, and application management. A whole new infrastructure was required and AM had to rebuild a very application on this new hardware. This requires specific skills. In size this is an average transition.

Complexities in the project in organizational aspects were a short lead time, inexperienced service manager and transition manager. Technical complexity is double sided. One part was straightforward. The other part was a very complex rebuild of a company critical application. This was a very old piece of software and was barely documented.

5.1.2 Case B

The second case describes a transition for a large company delivering optical consumer electronics i.e. camera's and printers. AM is client facing in this contract. This transition ran from July 2007 until March 2008.

The transition contains the hosting of a large internet site. This includes both infrastructure and the website. The size of the case is being classified as a large transition for AM and an average one for IM.

5.1.3 Case C

The third case describes a contract in the delivery phase. Here it is about solving incidents and problems. Next to these activities there are (change) projects that are executed. Although both departments have a similar share AM is client facing.

It is one of the largest contract within the organisation. The service delivery contains the management of a SAP ERP-system and bespoke applications. Next to this there are about 6000 (mobile) workspaces that are managed. The contract is over 11 years old and has a long history. In this case we focus on the last year. This is the same time-period as the other cases.

This contract is special because it is an internal contract. The client is part of the same organization as the supplier. Also the client is very demanding and the requirements are complex. For instance a possibility to connect all laptops to the network via a wireless connection. Other complexities lay in organizational aspects. Because of a high turnover of (managerial) employees the informal processes and connections must be rebuild every time.

5.2 Findings from case studies

5.2.1 Task Interdependence

The cases in our study provided interesting insights into the task interdependencies between both departments.

Case A

Intensity of workflow

The estimated effort for both departments was estimated before the start. In this estimation AM should perform 20% of the work and IM 80%. The 20% of AM actually caused 80% of the problems. Especially during solving these problems there were a lot of interdependencies in the problem solving tasks.

Direction of workflow

The main activity in this case is the transition of a business critical application. In this transition a new infrastructure was build. On this infrastructure AM has build a revision of the original software from the client. Because the software was very complex, and to ensure a stable operation with the infrastructure this required a lot of consultation. This happens in a reciprocal manner.

Shared Decisions

In the process design future it is decided on who will perform future tasks during the service delivery: AM or IM. They try to remove interdependencies in tasks between departments in advance and divide the work. Here the level of shared decision-making is high.

Task Interdependence

The level of task interdependence is a sum of the above. With a medium intensity, reciprocal workflow and high shared decision-making the level of task interdependence is graded as high.

Case B

Intensity of workflow

According to the transition manager (AM) the intensity of task interdependence in this transition was high and there was a high level of shared decision making. During the project it was not possible to make a distinction between AM and IM. On one side 50 servers are build and set up. On the other side AM people gathered knowledge about the applications from the client, and start building the application on the new servers. These tasks are interdependent in a reciprocal manner.

The project leader form IM has another view on the task interdependence. According to him, IM can build the platform (50 servers). AM builds the software on this platform when it is done. In his view there is a sequential task interdependence. IM builds servers. AM works on these servers when IM is ready. *“The task for IM: build the platform – is a separate task. (...) AM needs to receive the planning when it is being delivered, because then they can work on the platform. This went in separate phases. So AM could work on the platform. But we did our own project”.*

When this is not the case delays to the planning and waste of resources can occur. The service manger of AM said *“We needed someone form IM. Something had to be changed in a DNS-server, which should take about ½ day. This request was acknowledged. AM was dependent*

on this activity in order to continue. The IM technician had a training that day and could not perform this task.” The dependence of the task was not clear to both sides.

Direction of workflow

Other evidence shows that the task interdependence was more reciprocal in nature. Sometimes it is unclear in a task is AM or IM specific. *“It is possible that important ports on the server are closed. When you are sitting together you can easily ask for a technician to open the ports that are necessary for the application to work. This always is a grey area because this knowledge needs to be gathered. It is not crystal clear from day one. There is a piece of trial-and-error. That’s why people of both departments need to sit together.”*

Shared Decisions

In the process design future it is decided on who will perform future tasks during the service delivery: AM or IM. They try to remove interdependencies in tasks between departments in advance and divide the work. Here the level of shared decision-making is high.

Task Interdependence

The level of task interdependence is a sum of the above. With a high intensity, reciprocal workflow and high shared decision-making the level of task interdependence is graded as very high.

Case C 1

Intensity of workflow

With incidents there is a clear division of tasks between AM and IM. Incidents are submitted to the service desk. The service desk then sends the incidents to AM or IM, if they can’t solve this themselves. So with incidents there is low interdependence between tasks.

Direction of workflow

Most tasks are specifically for one department or the other. Only in the overall evaluation of the process is there an interdependence. In the case of interdependent tasks that are their occasionally there is a sequential direction, because they move from one department to the other. Mainly because a task directed from the service desk was directed to the ‘wrong’ department. But this may only become clear after an evaluation by the department the task is addressed to.

Shared Decisions 1

What does happen is that AM tasks are assigned to IM, or IM tasks to AM. The latter is the most common. This is when a malfunction or error within the software is caused by the hardware. Then there is an interdependence in shared decision making on who should take care of the incident.

Case C 2

Intensity of workflow 2

A change manager looks at the AM/IM interdependencies in advance. He evaluates if there are more teams involved. This is different for every change project. An example is given of a migration of a system to new hardware. Here the division of workload was about 70% for AM and 30% of IM. 20% of all tasks in this change were interdependent.

Direction of workflow Reciprocal

Changes almost always concern more than one team. Within a change there are a number of activities.

Within changes not all interdependencies between tasks are known from the start. Within the contract a lot of changes look AM specific. So there looks to be no interdependence in tasks between both departments. While executing the tasks a server (IM) needs to be bigger, better or faster. This is actually a general IT problem, according to the service manager of IM. And is hard to prevent from happening. Especially past experiences are important.

The following quote from a service manager of IM gives more meaning to this: *“In the execution I intervened in March. Or else IM would have noticed that things were not right far too late. AM did not involve IM in the process. AM was just busy bringing SAP to Windows and an Oracle database to MSSQL.”*

Shared Decisions 3

“A ‘request for change’ is the start of the process. When this is accepted a risk impact analysis (RIA) is made. Then a work order is made for the client to evaluate. (Now often a discussion about the release date of the change takes place. This is discussed in a formal meeting). Then a Change Implementation Plan is made (CIP). After this the actual change is made. After this a evaluation ends the change process”.

Task Interdependence

The level of task interdependence for C1 is a sum of the above. With a low intensity, sequential workflow and low shared decision-making the level of task interdependence is graded as medium.

The level of task interdependence for C2 is a sum of the above. With a medium intensity, reciprocal workflow and high shared decision-making the level of task interdependence is graded as high.

Summary

All the results are summarized into Table 16.

	Intensity	Direction	Shared Decisions	Task Interdependence
Case A	medium	reciprocal	high	High
Case B				
1 Start	high	reciprocal	high	Very High
2 Middle	high	reciprocal	high	Very High
3 End	high	reciprocal	high	Very High
Case C				
1 Process	low	sequential	low	Medium
2 Project	medium	reciprocal	high	High

Table 16: Task Interdependence results

5.2.2 Coordination Mechanisms

Case A

Noncoordination

In this case there is no evidence found for non-coordination.

Rules and Standards

Within this case rules and standards are not often used as coordination mechanisms. However, within the separate departments there are a number of rules and standards in use. For instance documented procedures.

We did find standards for governing transition projects like this one. Only in practice these standards were barely used since both departments have their own adaptation based on their specific needs. These specific needs are illustrated in the following quote from a delivery manager (AM): *“Within IM you ask for a Unix expert. When you have five of these they can all perform the task at hand immediately. Within AM the employees need to gain knowledge and expertise about the software. When I deliver resources it should be fulltime. This is different.”*

Another standard is the workflow management program EARS. This is software that facilitates the transition of task-specific information from one person/group to another.

Goals and Plans

Mutual goals and plans are not often used as coordination mechanisms. A transition plan, delivery schedules (planning), and budget goals were in use. However, these were mainly used on department level and rarely as coordination mechanisms between them. The transition plan was made by IM and had an IM focus, not taking into account the differences in resource planning between AM and IM. There was no joined coordination on budget goals. Both departments had their own budget goals because of separate profit and loss accountability.

At a certain time the higher management executed a higher level of control. Weakly progress reports were being asked. This process led to more shared goals. The service manager commented on this: *“in the transition the joint value was very important. This was because the pressure was very high, and big achievements had to be made. The collaboration out of a situation of high pressure is not normal”*.

Formal Mutual Adjustment

Formal mutual adjusting coordination mechanisms are the main coordination mechanism in the transition. A fulltime integrator, liaisons and structured meetings were the main coordination mechanisms used in the category.

The fulltime integrator was a transition manager from IM, with only an IM background. He was also the one responsible for the AM activities. Later on a delivery manager from AM assisted the transition manager from IM with coordinating activities on the AM side. The service manager from IM had a liaison role between the client and the internal organization. But she also directed the AM part to the delivery manager from AM. There were structured meetings between project members on a regular basis.

“At the time that everybody went back to their usual locations, we were not finished at AM yet; and we needed an IM employee. This had to be approved by the manager, because a specific person that had already worked on this project was needed.”

Informal Mutual Adjustment

This part scores as high. We found that informal mutual adjusting coordination mechanisms are often used in the transition. Co-location/team, phone calls, ad-hoc meetings, mail.

Along the way they formed a team. The reason to form a team was because of the size of the transition, which was large. Also because a new infrastructure needed to be build. About the use of a joined team someone stated the following: *“This is a real project. People are together. There was a lot of direct contact, so this went well. At the end of the project, things became somewhat more difficult. Thanks to the priority however, the collaboration went well. The pressure was on. At the end things were more difficult because a well-working team was being dismantled.”*

When the team was dismantled some issues arose again: *“In this project it was difficult to create collaboration. Because people were situated in one and the same room they got along very well. When the project was being dismantled things got more difficult. When somebody left on the first of July someone else took over.”*

Case B

Noncoordination

In the beginning of the transition (B1:start) there was no coordination between both departments. There were no plans. It was chaos and nothing was formally arranged. When a new transition manager was put on the project things changed for the better (B2:middle and B3:end). There is no evidence found for non-coordination after the beginning (B1).

Rules and Standards

For the rules and standards there is a great resemblance with the ones found in Case A. In summary this means there are some documented processes. Also standards for governing transition projects and the EARS workflow management tool. These rules and standards are company-wide adopted and therefore present in all three parts of the case (B1, B2, and B3).

During the interviews the intention to work towards shared rules was expressed by some. Specific people from the IM side stated this, because there they are more used to working with standard processes.

Goals and Plans

As said, in the beginning there was chaos. There are no goals and plans present according to the interviews. Further along (B2 and B3) a lot of work has been put in formulating a shared Service Level Agreement (SLA).

Both departments have their own budget in the project. According to the second transition manager there was a *“shared mission”*. And although both departments had their own planning, these plans were connected.

Formal Mutual Adjustment (B1:0 B2:2 B3:3)

Informal Mutual Adjustment

In the beginning (B1) there was a medium amount of informal contact between AM and IM. These contacts were via phone, e-mail and ad hoc meetings and personal visits. These contacts stayed during the rest of the project.

But when the project was structured and the new transition manager was assigned (B2) a team was formed with members from both AM en IM. Telephone, e-mail, ad hoc meetings and personal visits were also still in use. Because of these coordination mechanisms used during B2 it scores high in this category. Additionally a service level agreement (SLA) was created by service managers. A SLA in itself falls into the goals and plans category, but the making of the SLA was informally coordinated.

The making of the SLA continued during the end of the project (B3). What did end was the team. It was dismantled. But the contacts via telephone, e-mail and ad hoc meetings and personal visits were still there. This is why the score again is medium.

Case C 1

Noncoordination

In this case there is no evidence found for non-coordination.

Rules and Standards

There is a low amount of rules and standards. The EARS workflow management tool is a standard that is in use. Also some activities are captured in standards. The only example given is the setup of a new server. ITIL, a best practice based model for IT service management has some common standards, that is used by both departments. It is mostly in use by IM, because of the nature of the model. Also the 'standardization' is causing some confusion, because there are different definitions for the same concepts in each department.

Goals and Plans

There is a low amount of goals and plans. There is a one SLA. First there were two. One for each department. Now these separate SLA's are put together to one, but in practice they are still separate for AM and IM. There is no shared planning.

Formal Mutual Adjustment

There is a medium amount of formal mutual adjusting coordination mechanisms.

There are full-time integrators like the service managers and service coordinators. There activities are still mainly directed at their own department. The IM service coordinator needs to undertake action when stages are open to connect separate activities. The IM service coordinator is concerned with the support processes. *"I don't represent a team, in comparison with the AM service coordinator. We have no authority. We are concerned with the customer satisfaction. There we must call with delivery teams, customer, or AM in order to solve the customers problem, in accordance to the SLA."*

There are structured meetings in terms of a process meeting, where information is exchanged about running and coming projects, issues. *"It's a formal role-play where we all tell about our specific skills"*.

Informal Mutual Adjustment

There is a low amount of informal mutual adjusting coordination mechanisms. There are occasional lunches, and personal visits. Also e-mail and telephone are commonly used.

Case C 2

Noncoordination

In this case there is no evidence found for non-coordination.

Rules and Standards

For the rules and standards there is a great resemblance with the ones found in Case A and B. In summary this means there are some documented processes. Also standards for governing transition projects and the EARS workflow management tool. These rules and standards are company-wide adopted. The EARS Change model has the following steps:

- Analysis / Risk analysis
- quote / agreement with client
- implementation plan / implementation

Goals and Plans

There is a medium amount of goals and plans. There is a one SLA. First there were two. One for each department. Now these separate SLA's are put together to one, but in practice they are still separate for AM and IM.

There is a Change Implementation Plan (CIP), a shared planning. The planning with all the activities goes to all the team leaders. Because of the planning get committed to the change. Because of the planning people had hours assigned to work the change.

Formal Mutual Adjustment

There is a high amount of formal mutual adjusting coordination mechanisms. There are full-time integrators like the service managers and service coordinators. Their activities are still mainly directed at their own department.

Several structured meeting are in place. The Technical Advisory Board (TAB) is a weekly meeting where all the changes are discussed between AM and IM. The Change Advisory Board (CAB) is a bi-weekly meeting. AM and IM and the client get together to evaluate all the change.

Informal Mutual Adjustment

There is a medium amount of informal mutual adjusting coordination mechanisms. The main mechanism is a team that is formed with members of both departments.

Then there is Risk Impact Analysis (RIA). On paper this is a formal meeting where the impact is decided on, after which the action is implemented. *“In practice these are short emails. This can cause a lot of rework. The advantage of a structured meeting has been proven many times. In the example of an activity within a change where both AM and IM were involved in, it was expected that AM needed to give a lot of input. When working on the activity it became clear that IM had already solved the cause of the problem. By discussing these activities beforehand this could have been avoided.”*

Summary

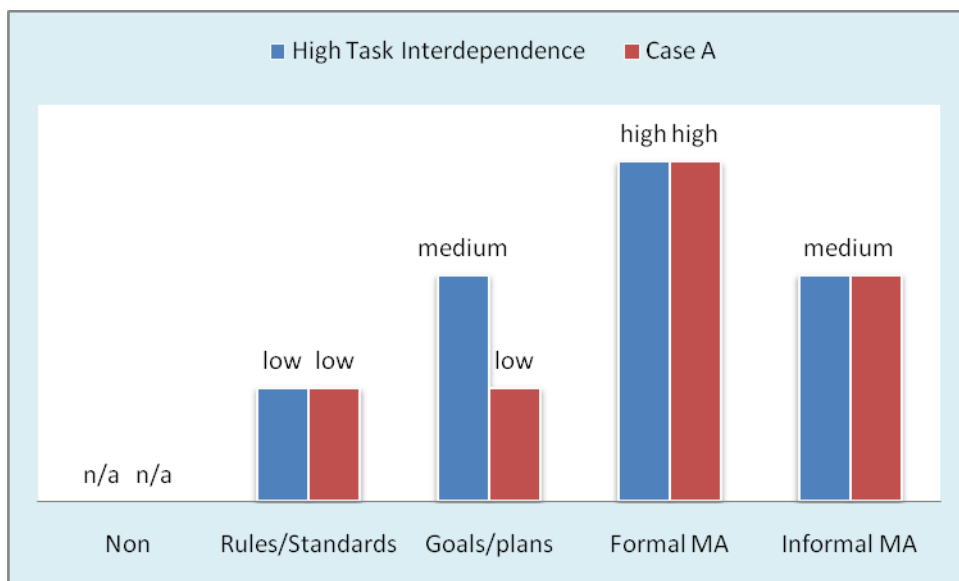
All the results are summarized in Table 17.

	Non	Rules/Standards	Goals/plans	Formal MA	Informal MA
Case A	not found	low	low	high	medium
Case B					
1 Start	medium	low	not found	not found	medium
2 Middle	not found	low	medium	medium	high
3 End	not found	low	medium	high	medium
Case C					
1 Process	not found	low	low	medium	low
2 Project	not found	low	medium	high	medium

Table 17: Results Coordination Mechanisms

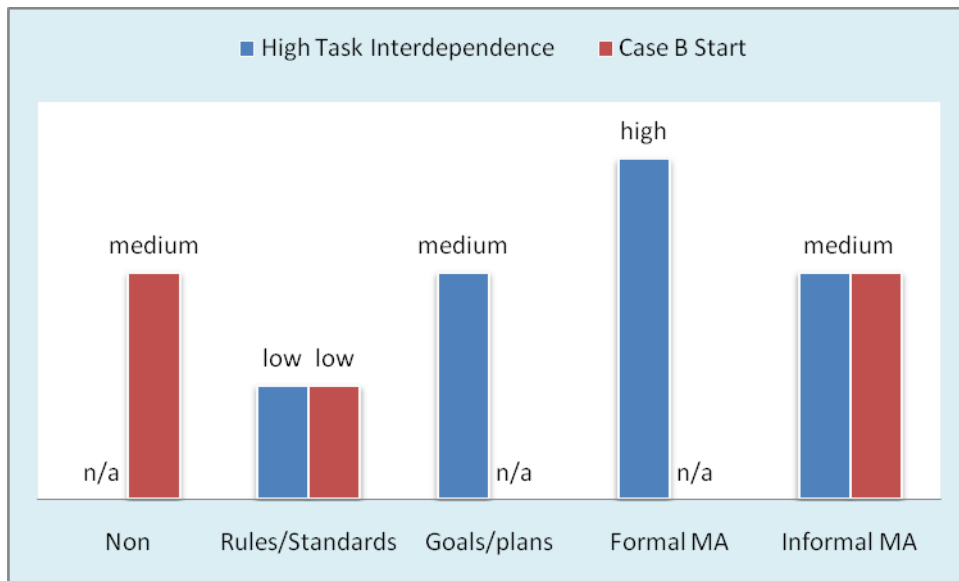
5.2.3 Task Interdependence and Coordination Mechanisms Fit

Case A



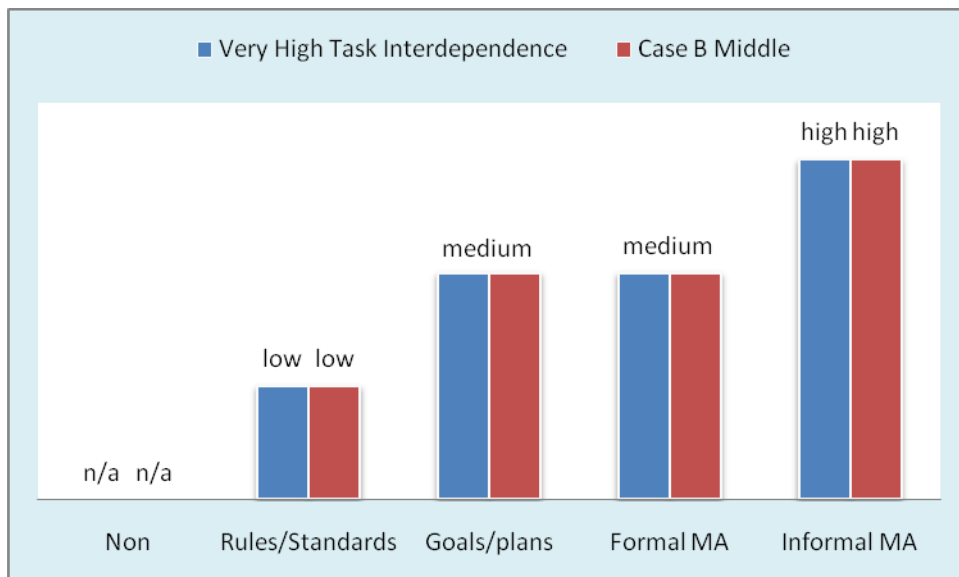
For case A we found high task interdependence. Our assumed division of coordination mechanisms in relation to high task interdependence, found in 3.5 is compared to the found division of coordination mechanisms in 5.2.3. We find the assumed fit and the actual results to be different. So we can state that there is no fit. We expect to have more use of goals and plans. There were for instance no shared budget goals.

Case B

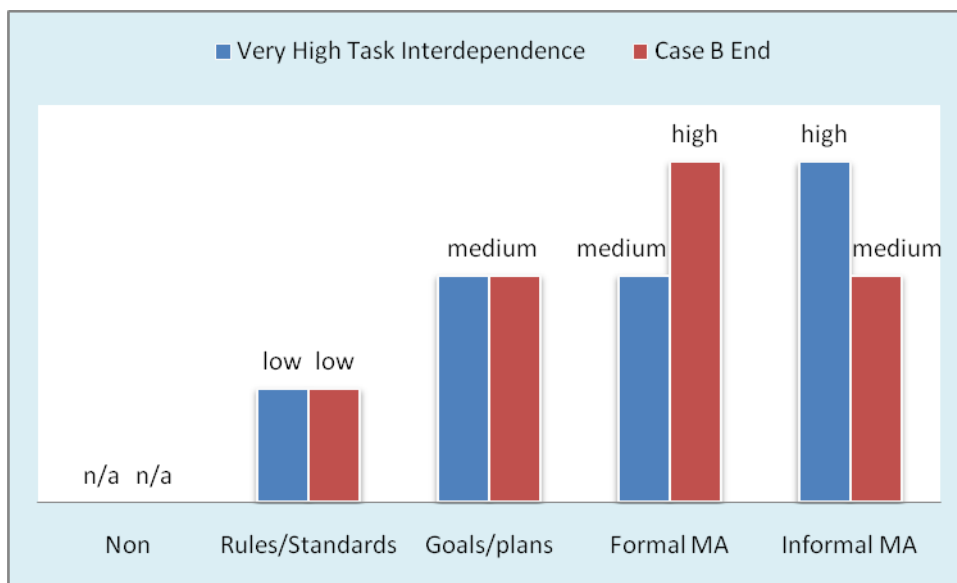


For case B1 we found very high task interdependence. Our assumed division of coordination mechanisms in relation to very high task interdependence, found in 3.5 is compared to the found division of coordination mechanisms in 5.2.3. We find the assumed fit and the actual results to be different. So we can state that there is no fit. There is a lot of non-coordination in interdependent tasks, which is never preferable. We expected a lot more goals and plans, formal mutual adjusting, and informal mutual adjusting coordination mechanisms.

This part of the project is described as chaos without a real plan or structured collaboration. There is no team. We only find a decent amount of informal mutual adjusting coordination mechanisms and rules and standards that are standard present in the organization.



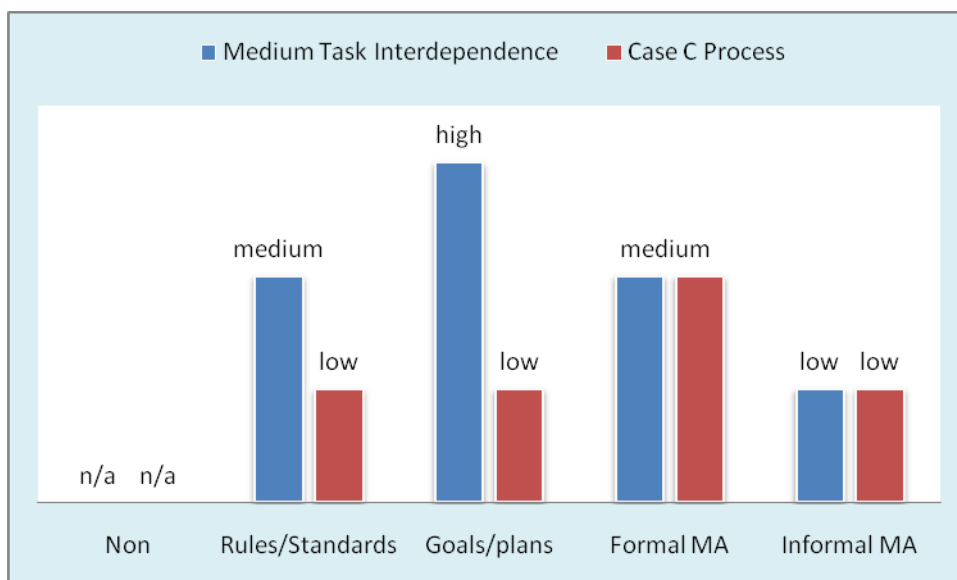
For case B2 we found very high task interdependence. Our assumed division of coordination mechanisms in relation to very high task interdependence, found in 3.5 is compared to the found division of coordination mechanisms in 5.2.3. We find the assumed fit and the actual results to be equal. So we can state that there is a fit.



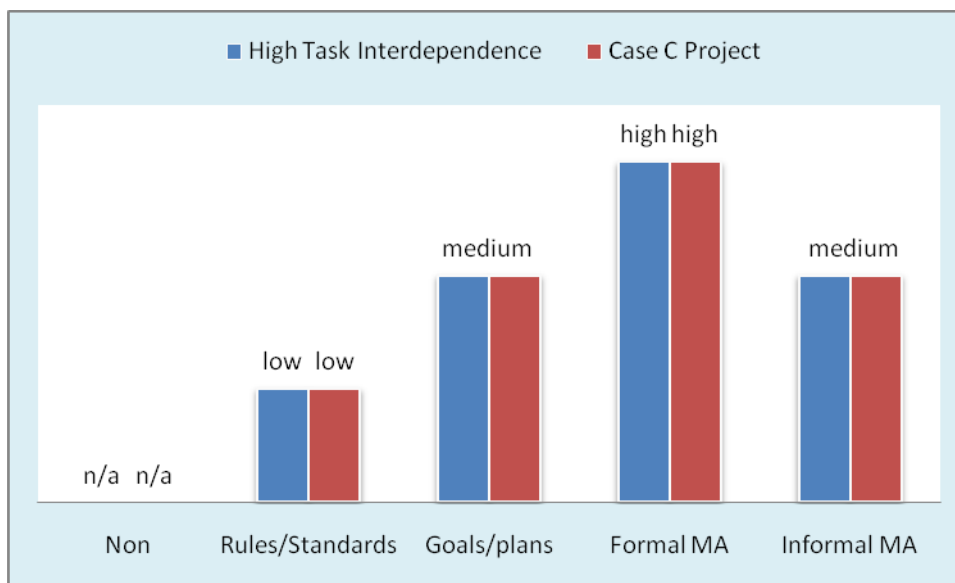
For case B3 we found high task interdependence. Our assumed division of coordination mechanisms in relation to very high task interdependence, found in 3.5 is compared to the found division of coordination mechanisms in 5.2.3. We find the assumed fit and the actual results to be different. So we can state that there is no fit. We expect to have more use of informal mutual adjusting coordination mechanisms and less use of formal mutual adjusting coordination mechanisms.

Different with B2 is that there is no more team but a stronger project leader which coordinated the interdependent tasks. Apparently there was too little coordination for the very high task interdependence.

Case C



For case C1 we found medium task interdependence. Our assumed division of coordination mechanisms in relation to medium task interdependence, found in 3.5 is compared to the found division of coordination mechanisms in 5.2.3. We find the assumed fit and the actual results to be different. So we can state that there is no fit. We expect to have more use of 'rules and standards' and 'goals and plans'.



For case C2 we found high task interdependence. Our assumed division of coordination mechanisms in relation to high task interdependence, found in 3.4 is compared to the found division of coordination mechanisms in 5.2.3. We find the assumed fit and the actual results to be equal. So we can state that there is a fit.

5.2.4 Collaborative Success

Case A

Effectiveness

The effectiveness of the total contract is low. De expectations out of the sales process were very high. However, the organization did not manage to substantiate these expectations within the specified period of time. The respondents are of the opinion however, that this had nothing to do with collaboration issues. At the start of the project the customer mentioned that the application was very old. And they had tried to convert the application many times themselves. For the organization this application also was the biggest obstacle. The customer was very disappointed.

Satisfaction

The employee satisfaction is medium. The work content and the relationship between the employees was good. Criticism was openly expressed. The tight control of higher management on the project caused a lot of pressure and discomfort. However, a personal project leader for AM would have been better. Not someone with a IM background who also works at AM. The project leader was not familiar with AM procedures. This caused more discussion and the collaboration was more difficult because of this.

Case B

Effectiveness

The effectiveness is medium. In October the transition seemed to be out of control, but in the end the customer was satisfied with the result. The collaboration/internal discussion did not influence this. There's yet an OTACE-score of 3.1.

Satisfaction

The disagreement on this issue was large, from high to low. Some say it was good, because the organization presented itself as one company to the customer. There was collaboration between Sales, AM en IM. Involvement and unity was shown to the customer. Collaboration with the employees and the project leaders was good.

For others, the collaboration was bad. There are two silos; a situation which originated in the past. Customers specifically asked for management of hardware or applications. Nowadays, there are more combination deals. The current structure does not suffice. There are two silo's who merely come together at sector level. There must be more joint activity instead. There's little understanding for each other's situation, because employees do not know each other very well.

Case C

C1 Effectiveness

The effectiveness is low. The customer is very dissatisfied. A low OTACE-score of 2,5 underlines this. Promises are not being kept. The customer is not being informed and a lot of faults are being made.

The customer does have a tendency to interfere with operational matters. Partly, this is due to the exceptional relationship between customer and supplier, because they are both part of the same organization. They know a lot about outsourcing, and is very pragmatic. Were you would like a more strategic view. From customer comments, AM seems to be communicating better. That's why the customer experiences better quality from them.

C1 Satisfaction

The satisfaction is medium. Collaboration feels good. IM Counterparts are open to comment and collaboration. However, in the realization things go wrong often. There's trust between AM and IM. This is proven by the fact that people are willing to take things over for each other. Mutual support is important. Especially since Service coordinators were being declared.

Within IM, there's the tendency to persecute certain things. Because of circumstances, this is not always successful, but the AM Service coordinator is always willing to help out or take over. There's an attitude of collectiveness. It is the overall work-pressure that is causing a lower satisfaction. There are capacity-issues within IM.

C2 Effectiveness

Satisfaction is high. Projects are finished in time and the communication is good. Internally things are run smoothly, which radiates to the customer. The success is explained by the fact that people feel responsible for what they do.

The SAP migration was carried out successfully. The customer commented that this was a good example of how things should be done. Internally however, things did not go as smoothly, and the Service manager IM had to interfere once. This was because of lack of experience. Most things are learned by training on the job, evaluation afterwards and keeping each other sharp during the project. Communication, information and commitment are called important for being effective. This was an example of a risk full, complex project which was finished successfully.

C2 Satisfaction

The satisfaction is high. Collaboration feels good. IM Counterparts are open to comment and collaboration. However, in the realization things go wrong often. There's trust between AM and IM. This is proven by the fact that people are willing to take things over for each other. Mutual support is important. Especially since Service coordinators were being introduced.

		Effectiveness	Satisfaction
Case A		Low	medium
Case B			
1	Start	Low	low
2	Middle	Medium	high
3	End	Medium	medium
Case C			
1	Process	Low	medium
2	Project	High	high

Table 18: Results collaborative success

5.3 Link between fit and collaborative success

The results of the each case are found in the previous section. The fit is assessed for each case. An overview is stated below.

		Effectiveness	Satisfaction	Fit
Case A		low	medium	no fit
Case B				
1	Start	low	low	no fit
2	Middle	medium	high	fit
3	End	medium	medium	no fit
Case C				
1	Process	low	medium	no fit
2	Project	high	high	fit

Table 19: Results fit and collaborative success

The table shows the degree to which there is a relation between the success of the collaboration and the fit. When there is a fit we expect a high level of success in terms of effectiveness and satisfaction.

Scenario 1: There are no cases with low task interdependence. There are no results to compare to this scenario.

Scenario 2: There are results for a case with medium task interdependence (C Process). Here we find no fit between the task interdependence and the used coordination mechanisms. Also the effectiveness and satisfaction within this specific case are suboptimal (low and medium).

Scenario 3: There are results for cases with high task interdependence (A and C Project). We found success when there is fit and no success when there is no fit.

Scenario 4: There are results for cases with very high task interdependence (B1, B2, B3). We found no success when there is no fit. We found an increase in success, when there is fit. But effectiveness was medium (B1 to B2). In B3 again there is no fit and success declined. But only in terms of satisfaction (from high to medium).

The results show a great resemblance to the scenario's stated in 3.5.5. Case A, B1 and C1 show when there is no fit there is no successful collaboration (in terms of efficiency and satisfaction). With case C3 this is less clear, because of a medium score for success. On the other hand, B2 and C2 show a positive relation between fit and success. The only side note here is that effectiveness is medium in B2. This is most likely because of the bad start of the project (B1).

Contract phase overview

The cases we studied are mostly projects. Two transitions and one change. There is only one case with a continuous process. Because the interdepartmental collaboration is relatively new in the organization, there are no more cases that exist longer than a year. Nevertheless we will arrange the results according to each phase in the contract and compare them to the scenario's.

Transitions: Transitions have high to very high task interdependence. Most issues with fit are related to too little use of goals and plans as coordination mechanism. Also the different mutual adjusting coordination mechanisms are causing misfits. With no exception a misfit has a low or medium effectiveness and low or medium satisfaction.

Projects: Project(s) have a high task interdependence. There are no issues with fit. Also success is high in both dimensions.

Continuous process: Here there is a medium task interdependence. There is a clear misfit. This is because of limited use of goals and plans as coordination mechanisms, where we expect a much greater use. This misfit comes with a low effectiveness and medium satisfaction.

6. Conclusion and Recommendations

This study investigated the fit between the level of task interdependence and the use of coordination mechanisms in interdepartmental collaboration in a IT service management organization. And if this fit relates to collaborative success. Using a multi-case study we related the results of the level of task interdependence and the different coordination mechanisms in use to scenario's of fit. Furthermore we have related these outcomes to collaborative success in terms of effectiveness and employee satisfaction.

6.1 Conclusion

In the research we found collaborative success when there is fit and no success when there is no fit. The results show a great resemblance to the scenario's stated in 3.5.5. Case A, B1 and C1 show when there is no fit there is no successful collaboration (in terms of efficiency and satisfaction). With case B3 this is less clear, because of a medium score for success. On the other hand, B2 and C2 show a positive relation between fit and success. The only side note here is that effectiveness is medium in B2. This is most likely because of the bad start of the project (B1). But more on this later.

There is a fit between the level of task interdependence and the use of coordination mechanisms when there distributed according to the following graphs (Figure 10):

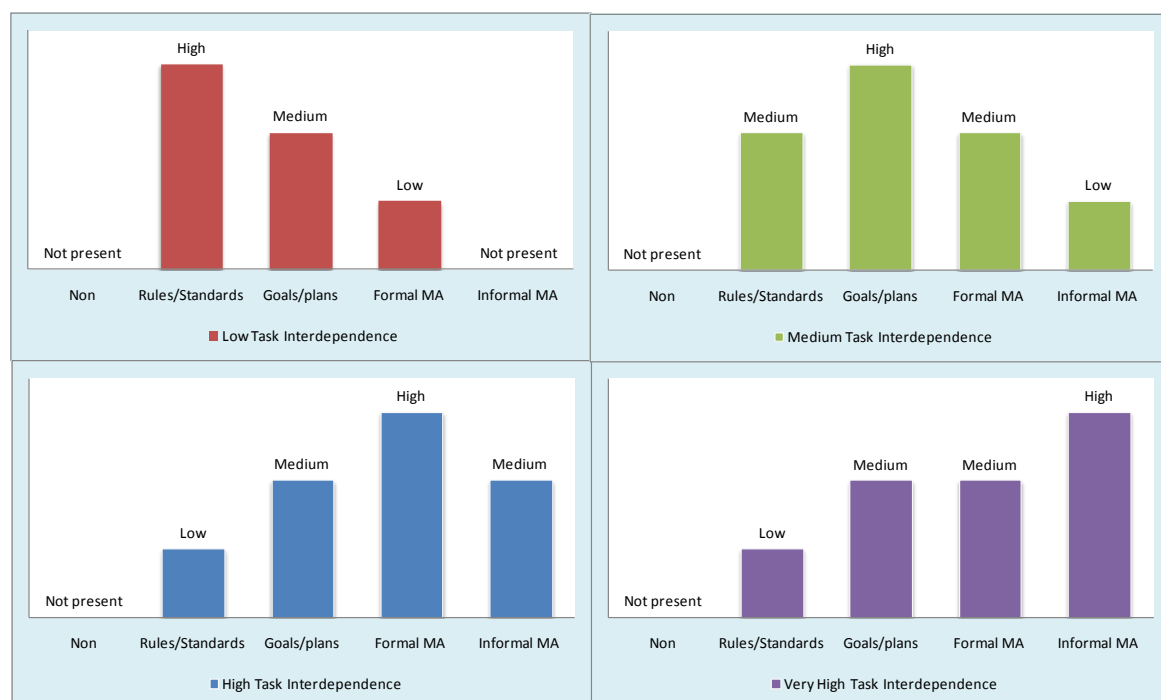


Figure 10: Assumed fit of task interdependence and coordination mechanisms

According to this research, teams are more capable of higher levels of coordination than full-time integrators, because teams are not dependent on the "people skills" of a single integrator. In case B a change in use of coordination mechanisms through time, without changing task interdependence showed this. A team was stopped and a project leader was given the task to coordinate everything between both departments. This showed a decrease in overall coordination, no fit and lower success scores.

We expected that fit between the level of task interdependence and the use of coordination mechanisms led to high effectiveness and satisfaction in shared contracts.

Case B gained a special interest because it is the only case where we found no success when there is no fit. We did find an increase in success, when there is fit. But effectiveness was medium (B1 to B2). In B3 again there is no fit and success declined. But only in terms of satisfaction (from high to medium). Effectiveness is medium in B2.

6.2 Theoretical Implications

Based on the results there are some implications for theory following from this study. The first is concerned with coordination mechanisms. We found teams are more capable of higher levels of coordination than full-time integrators, because teams are not dependent on the "people skills" and availability of a single integrator. More know more than one seems at place here. This study endorses the view of Daft (1992) and Galbraith's earlier distinctions between lower-level liaisons and full-time integrators, as well as between permanent teams and temporary task forces.

Two other theoretical implications come from Case B. This is the only case where we found no success when there is fit. We did find an increase in success, when there is fit. When there is no fit in the beginning of a project, this bad start hampers effectiveness along the rest of the project. Employee satisfaction is easier 'repaired' and our results did not show this 'memory'-effect. Errors at the start are hard to make up later on in the project. This is in line with the findings of Hoegl et al. (2004). Also when there is a fit in case of very high task interdependence it is harder to achieve success on effectiveness. The very high task interdependence causes compromises and suboptimal outcomes in general. Hence, while interdepartmental coordination enables the department to ensure that schedules are being met, it may also drive up development costs as coordinative activities require members' time commitment ("keeping them in meetings rather than at work") and uncover further testing requirements or necessary changes/adaptations to current designs. This also means finding compromises between both departments. This offers support to earlier research (Tushman 1977, Clark and Fujimoto 1991, Loch and Terwiesch 1998, Hoegl et al. 2004).

In 3.2 we discussed expertise coordination as it was not in accordance to the research focus (Faraj and Xiao 2006). It is a completely different view leaving behind the organizational-design perspective with rules and structures to meet external demands. Expertise coordination practices (reliance on protocols, community of practice structuring, plug-and-play teaming, and knowledge sharing) are essential to manage distributed expertise and ensure the timely application of necessary expertise. In IT service management problem solving may very well benefit from this approach (Faraj and Sproull 2000).

Further research is needed to examine the extent to which of this paper's findings, can be generalized to other situations. These include other IT outsourcing organizations, and outsourcing of other areas (e.g., accounting). Future research may also compare the coordination mechanisms used in intra organizational collaboration with those used in inter organizational collaboration, which involve another organization, and considerations of equity may be considered more important.

With task interdependence the research has an inward focus. In future research concepts of uncertainty and other external factors need further investigation in the research context. Future research may develop measures of these constructs to examine changes in these aspects as well in relation to the coordination mechanisms.

6.3 Managerial Implications

The main managerial implication is aimed at the fit of task interdependence and coordination mechanisms. Decide on the level of task interdependence, by assessing joined tasks. Then fit coordination mechanisms according to the figures in the first part of this chapter.

Posed below are recommendation based on the specific business processes in the research organization, assuming that in other contracts task interdependencies are similar.

Transition

Use more 'goals and plans' coordination mechanisms like shared transition budget, a joined planning and clear transition goals to improve the situation.

Form a (virtual) team as the main informal coordination mechanism when there is a very high task interdependence. Also aim at dedicated members from IM, when possible. Form these teams in an early stage. This takes away personal skills of integrators and liaisons later on and helps preventing rework. A bad start is felt during the entire transition. Also the people start to know each other which can benefit later on during service delivery.

Regarding the mutually adjusting coordination mechanisms, a sufficient amount is present within each department. There are full-time integrators, teamleaders and/or liaisons. Most of these mechanisms are focussed on only one department, where they should) widen their focus across 'the border' on the contract as a whole.

Service delivery

Use more 'rules and standards' and 'goals and plans'. The results show development of more standardized procedures. For increasing the amount of 'goals and plans' similar goals can be realised via a joined SLA. Really joined, not just two SLA's in one document. When moments of increased interdependence may occur, a task-force is advised to face the increased need for coordination.

Service delivery project

The case shows a good example of a successful service delivery project. There is a shared planning. A change manager manages the project, not just the part of the project in one department. There are efforts on standardizing the common procedures, and regular formal and informal meetings.

Other short recommendations:

Aim at centralizing project management unrelated to the departments. The organization has a shared project management method. Within projects (full time) integrators must have the skills and knowledge to manage both sides. With a common method this seems not to complex. Otherwise two integrators (one for every department) is an alternative, although suboptimal.

Set joined goals and budgets. Remove conflicting performance measurement to stop rewarding conflicting behaviour. This is closely related to a shared budget.

When collaboration within one department is hard, this also needs to be addressed. It can benefit from this study's results and insights. This makes it easier to connect the other department to the process.

6.4 Limitations

A few limitations of this study should be noted. Although we selected contracts within the same timeframe one was finalized longer ago. This retrospective data might have left out important details. Also there is lack of diversity between the cases (two transitions, one change, one process). This is caused by novelty of collaborative contracts. There are little collaborative contracts that exist longer than a year.

Probably because of the function of our respondents we mostly received answers related to mutual adjusting coordination mechanisms. Operational standards and rules and plans may actually be more in place then the results suggest. Focus on misfit. Things that are standards you work with every day may come for granted. The mechanisms that require more work or cause stress of discomfort are possible overrepresented.

While the study demonstrates associations between variables, it cannot establish causality. A longitudinal research design using multiple cases would further the knowledge toward both causality of relationships. Second, the scope of the empirical data gathered for this research allows generalization of the results obtained chiefly to the domain of service organizations, or more specific IT outsourcing organizations. Infrastructure and applications management may seem closely related, but the differences are often reason for conflict. This has an important advantage over closer related situations of interdepartmental collaboration. The study of Hoegl et al (2004) found no relation between effectiveness and interteam collaboration because of suboptimal compromises between teams of an engineering company.

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Appendix A. Interview Protocol

Interview Protocol (English):

1. What is your role in the project?
2. Briefly describe the project. What is the size and duration of the project? How complex is the project? How long are you involved with the project?
3. Task interdependence refers to the intensity and direction of a workflow relationship between teams. This inhibits tasks or stages, and decision making. In the view of collaboration with teams of the other department, what interdependent tasks can you think off? Can you elaborate in this in terms of a, b, c, and/or d? *Specified into your role or general tasks.*
 - a. Type of task
 - b. Intensity of shared tasks (How much collaboration does the task require?)
 - c. Direction of shared tasks
 - d. Process of shared decision making
4. In a simplified model of coordination, an overall problem is divided into subtasks and the parts are assigned to individuals. Coordination mechanisms are the mechanisms that divide and combine these subtasks (stages). What coordination mechanisms can you think off, that are used in relation to the interdependent tasks in the previous question?
 - a. Rules and standards (systems)
 - b. Plans (procedures, standard plans)
 - c. Formal mutual adjustments (integrators, teams)
 - d. Informal mutual adjustments (training, collocation, teambuilding activities)
5. Is there a rationale in the use of coordination mechanisms in relation to the collaborative tasks? Can you elaborate on this? (Framework, procedures, rules or guidelines)
6. What is your opinion on the success of the project in terms of a, b and c?
 - a. Quality of service, meeting expectations of quality.
 - b1. Adherence to schedules (of shared tasks).
 - b2. Adherence to budgets (of shared tasks).
 - a. Satisfaction with the collaboration in this project?

Interview Protocol (Nederlands):

1. *Wat is je rol in het project?*
2. *Kun je kort het project beschrijven. Wat is de grootte en looptijd van het project? Hoe complex is het project? Hoe lang ben je betrokken bij dit project?*
3. *(‘Task Interdependence’ verwijst naar de mate afhankelijkheid en richting van een gedeelde taak of werkrelatie tussen teams. Dit omvat taken (werkzaamheden), en het gedeeld nemen van beslissingen.)*

In het kader van de samenwerking tussen teams van de andere afdeling, welke gedeelde taken zijn er?

Kun je hier wat dieper op ingaan in termen van a, b, c, en/of d?

Hoe groot is het aandeel van gedeelde taken op de totale werkzaamheden?

- a. *Omschrijving van de gedeelde taak*
 - b. *Mate van afhankelijkheid (Hoeveel samenwerking vereisen de taken)*
 - c. *Richting van de gedeelde taken (AM naar IM, IM naar AM, beide kanten uit)*
 - d. *Process van gedeelde besluitvorming*
4. *In een vereenvoudigde weergave van coördinatie wordt een algemeen probleem onderverdeeld in subtaken, die vervolgens toegeschreven worden aan groepen of personen.*

Coördinatiemechanismen zijn de mechanismen die dergelijke problemen of werkzaamheden opdelen in subtaken (stages) en de subtaken weer samenbrengen.

Welke coördinatie mechanismen kun je bedenken, die gebruikt worden in relatie tot de taken uit de vorige vraag?

- a. *Standaarden, regels*
 - b. *Plannen en procedures*
 - c. *Formele afstemming*
 - d. *Informeel afstemming*
5. *Wat is je mening over het succes van het project en termen van a, b en c?*
 - a. *Kwaliteit van de service/dienstverlening. Voldoen aan de verwachtingen van kwaliteit.*
 - b1. *Voldoen aan de gestelde tijdsplanning*
 - b2. *Voldoen aan het gestelde budget*
 - c. *Tevredenheid van de samenwerking tussen AM en IM in het project?*

Appendix B. Concept Matrix Task Interdependence

Authors/Date	Interdependence Conceptualization	Level of analysis	of Measure	Findings	Methodology	Concepts
Adler 1995	Task	Group	Perception	Increasing novelty of fit Issues requires use of more interactive coordination mechanisms decreasing analyzability of fit issues requires more coordination effort in later phases	Inductive case study 13 Organizations CAD/CAM	Product/Process fit Analyzability+ Novelty
Andres and Zmud 2002	Task	Group	Perception		Experimental design - Undergraduates	Task Interdependence, Goal Conflict Coordination Strategy Success
Faraj and Sproull 2000	Skill / Knowledge	Individual	-	Expertise coordination is related to team performance	Hypothesis testing, 333 respondents in a software development division	
Hoegl, Weinkauff et al. 2004	Task / Outcome	Group and Individual	Perception	interteam coordination project commitment, and teamwork quality are positively related and related to team performance	Case Study – Automotive	Task Interdependence Interteam coordination
Kazanjan, Drazin et al. 2000	Task	Group	Perception	Propositions about interdependencies and team creativity	Case study of large NPD- high technology	
Kiggundu, 1981	Task	Individual	Perceived vs Actual	Propositions. Type task interdependence influences motivational factors.	Literature study	
McCann and Ferry 1979	Transactional	Group	Actual	Typology of transactional interdependence and moderators	Building of a conceptual framework	Dimensions of transactional interdependence: resources, transactions, value, time, direction.
Sanchez and Worren 2005	Task	Group	Perception			Predictability – Credibility
Sethi 2000	Task / Outcome	Group	Perception	Superordinate identity has a positive effect on NP performance. Outcome interdependence, autonomy and team longevity are positively related to superordinate identity.	Hypothesis testing (conceptual framework) using mail survey data of 118 NPD teams in large consumer product manufacturing firms.	Superordinate identity, New Product Performance, outcome interdependence, task interdependence, and other traditional team factors.
Thompson 1967	Task	Group	-			

Authors/Date	Interdependence Conceptualization	Level of analysis	Measure	Findings	Methodology	Concepts
Tushman 1977	Task	Group	Perception	More boundary roles with increased complexity.	Hypothesis testing with questionnaire of 345 professionals in R&D facility of large US company	Boundary roles, task interdependence, NPD team performance
Ven, Delbecq et al. 1976	Task	Group	Perception	Task uncertainty, interdependence and work size influence coordination mechanisms	Hypothesis testing with questionnaire 197 units	task uncertainty, task interdependence, unit size, coordination mechanisms
Victor 1990	Task	Group	Actual	Three-way interaction between differentiation, interdependence, and interest conflict affecting degree of coordination	Experimental design - 104 MBA Students	localization, formalization, and cooperativeness of a coordination strategy
Victor and Blackburn 1987	Relational	Group	Perception	-	-	Reflexive control/ Behaviour control / Fate control
Wageman 1995	Task / Outcome	Group	Perception /Actual	Groups performed best with pure individual or group interdependencies and rewards. Tasks influenced cooperation.	An intervention in the reward system at a large U.S. corporation group, individual, and hybrid rewards for 150 existing teams of technicians that had group, hybrid, or individual tasks.	Task interdependence, outcome interdependence, group effectiveness
Wong, DeSanctis et al. 2007	Task	Group	Perception	The amount of interdependency was positively associated with role conflict, and clarity of interdependency was negatively associated with role ambiguity. There was also support for the job demands-control model as greater job control reduced role ambiguity when clarity of interdependency was low. Higher job control produced lower role ambiguity when both clarity and amount of interdependency were low, higher job control did not produce lower role ambiguity when clarity of interdependency was low and amount of interdependency was high, suggesting that the buffering value of job control on reducing role stress is contingent on the task interdependencies that managers confront.	Survey Executive MBA students US, N = 113. different industries	Task interdependence (amount and clarity), job stress, job control

Appendix C. Concept Matrix Coordination Mechanisms

Author/Date	Coordination	Coordination Mechanisms	Level of Analysis	Findings	Methodology
(Adler 1995)	Information Processing (IP)	Noncoordination, rules and plans, mutual adjustment, team in phases of NPD	Between groups	Increasing novelty of fit Issues requires use of more interactive coordination mechanisms Decreasing analyzability of fit issues requires more coordination effort in later phases	Inductive case study 13 Organizations CAD/CAM
(Ancona and Caldwell 1992)	Tasks/Information	External activities of teams: Mapping, molding, Coordinating and negotiating, Filtering	Between groups	External activities of teams predict team performance	38 NPD managers in high technology / members 45 NPD teams. Questionnaire
(Andres and Zmud 2002)	IP	Organic – Mechanistic	In groups	-	Experimental design - Undergraduates
Brown, 1999	IP	Formal Roles Formal Groups Informal Mechanisms	Between groups	X	X
(Faraj and Xiao 2006)	Expertise	<ul style="list-style-type: none"> • Reliance on protocols • Plug-and-play teaming • COP structuring • Knowledge sharing 	Multilevel	With expertise coordination 90% of tasks rely on found CM's and 10% require additional actions.	Combination of observation, archival, and interview techniques Trauma Centre US
(Hoegl and Gemuenden 2001)	IP	p. 447	In groups	TWQ is related to team performance	575 members of 145 german software teams
(Hoegl, Weinkauff et al. 2004)	IP	Interteam Coordination	Between groups	interteam coordination project commitment, and teamwork quality are positively related and related to team performance	Case Study – Automotive

Author/Date	Coordination	Coordination Mechanisms	Level of Analysis	Findings	Methodology
(Malone and Crowston 1994)	Coordination Theory	Task vs Task Task vs Resource Resource vs Resource	Multilevel	Model for applying 3 coordination perspectives	-
(Crowston 1997)	Coordination Theory	Task vs Task Task vs Resource Resource vs Resource		Illustrating the potential of coordination theory for exploring the space of organizational processes.	Case study in software development.
(Olson, Walker et al. 1995)	IP	Figure 1 Mechanistic - Organic	Between groups Between projects	Fit between newness of product and participativeness of the coordination mechanism	Managers 15 divisions of 12 large firms, 45 NPD projects
Sabherwal, 2003	IP	Standards Plans Formal mutual adjustment Informal mutual adjustment	Between groups	Coordination mechanisms used in outsourced IS projects (client-vendor relation) are examined, factors influencing the evolution of coordination mechanisms are identified, and a model of evolution of coordination is developed. Three scenarios for the evolution of coordination : non-coordination, consistent coordination, late coordination.	Two multiple case studies: seven and four cases from vendor and client perspectives, respectively
(Tushman 1977)	IP	Boundary roles: Gatekeepers, Organizational Liaisons, Laboratory Liaisons	Between groups	Boundary roles in innovation are important	345 professionals of R&D facility in US corp.
(Ven, Delbecq et al. 1976)	IP	Programming - Feedback	Multilevel?	Task uncertainty, interdependence and work size influence coordination mechanisms	Hypothesis testing with questionnaire 197 units
(Victor 1990)	Tasks	Organic – Mechanistic	Between groups	Three-way interaction between differentiation, interdependence, and interest conflict affecting degree of coordination	Experimental Design - 104 MBA Students

Appendix D. Prestudy results

Conducted Interviews:

AM	Service management	Project Management	Delivery Management	Service Coordinating	Software Engineering
Formal	3	1	1	0	0
Informal	2	3	2	2	3
IM	Service management	Project Management	Delivery Management	Process Coordinator	Support
Formal	3	0	1	1	0
Informal	1	2	2	1	0

Strengths and weaknesses of collaboration

Goed:

Trainingsprogramma Management	2	Constructive informal contacts between management 2
SLA's worden gehaald	1	
Meerwaarde bieden door Change/problem	1	

Verbeter:

Geen standaardisatie/ onvoldoende afstemming	6	Coordination 8
Procesmatig werken. IM teveel, AM te weinig	4	Standardization 6
Gebrek aan gelijke doelen	4	Lack of common goals 4
AM Service Coordinator niet opgeleid in IM manieren	4	Profit&Loss accountability 4
Profit & Loss	4	Capacity 3
Geen/weinig/lastige Coördinatie over practice heen	4	
Capaciteit	3	

Wat zouden ideale mogelijkheden zijn om de samenwerking te verbeteren?

Uniform procesmanagement	5
Standaardisatie	4
Klantgericht/contractgericht, via bevoegdheden en over teams denken	3
P&L afschaffen	2
Informeel contacten stimuleren	2
Practicemanagers meer harmonie/één persoon	1
Opleiding Service Coordinator in problem, change en incident management	1