# **Stickiness in Global Sourcing**

A Longitudinal Case Study of Stickiness in Outsourcing Art for Video Games in IO Interactive



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### **Executive Summary**

In global sourcing, expected cost reductions or anticipated access to skilled labor are often eclipsed by difficulties in operations. Most firms report operational problems soon after the implementation begins: Quality is not as high as expected, the foreign partner does not deliver in time, or more effort than estimated is needed to communicate requirements back and forth.

Operational difficulties or stickiness in global sourcing may, in worst cases, lead to delays in production and/ or reversal of sourcing decisions and ultimately severe financial losses.

However, firms that persevere and stay with their global sourcing decisions continuously adjust their operations, and eventually the difficulties or stickiness in their global sourcing decreases.

This research takes an activity based operational perspective on global sourcing in order to illuminate the causes of stickiness in global sourcing and how stickiness develops over time. The research is a case study that seeks answers to the research question:

#### What factors cause stickiness in global sourcing and how does stickiness develop over time?

To answer the research question, the Danish video game manufacturer IO Interactive's outsourcing of computer animated art to China is studied. Since 2004 IO Interactive have outsourced parts of the activities involved in computer animated art production to partners in Shanghai and Suzhou, China. Over the years they have experimented with different outsourcing constellations to improve their work flow with the Chinese partner and to cope with the numerous operational issues that have emerged.

Reviewing the global sourcing literature made it feasible to propose a model for explaining stickiness in global sourcing and to show how it develops over time. This model, the Longitudinal Model for Stickiness in Global Sourcing, is a synthesis of several theories on knowledge transfer, stickiness, strategic and operational global sourcing. It hypothesizes that *for an activity sourced globally the activity attributes' dynamics reduce stickiness over time*. This means that it is the inherent nature of the activity, the activity's attributes, that causes stickiness, and that the attributes' dichotomies change over time in direction of reducing stickiness. The change agents are management decisions, contextual changes and experiential learning in the organization. The activity's attributes are found to be the 'variability', 'inseparability', 'tacitness' and 'interdependency'.

To be able to verify the main hypothesis it is operationalized into four sub hypotheses, one for each activity attribute. Each of the sub hypotheses is tested empirically on the basis of the case findings in IO Interactive's art outsourcing venture.

For the most part, the tests show that the attributes cause stickiness, and that the dichotomies of the attributes over time change in direction of reducing stickiness. They also show how the above change agents facilitate the process.

Therefore, the case findings verify the sub hypotheses and consequently the main hypothesis. In conclusion, the factors that cause stickiness in global sourcing are the dichotomies of the activity attributes and over time they develop in direction of reducing stickiness.

These results are valid for the video game manufacturing industry and the research is meant as a building block in the direction of further understanding global sourcing operations in general and stickiness in global sourcing in particular. If the same results apply to other industries, it would mean that firms should consider operational stickiness as an integral part of their strategic decision on what to source globally.

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## **1** Introduction

"We gave work to people that had never really done this kind of technology before, and then we didn't provide the oversight that was necessary" Jim Albaugh, Commercial Aviation Chief, Boeing (LA Times, 2011.02.15).

The Boeing 787 Dreamliner flew its first commercial flight from Hong Kong to Narita in September 2011. The flight was 3 years delayed and billions of Dollars over budget. The reason for the delays and massive additional costs was that Boeing had gone from outsourcing 5% to 30% of the production. Boeing explained that "... [m]any pieces manufactured by suppliers didn't fit together." (LA Times, 2011.02.15)

Operational issues in global sourcing are often overlooked or down played by management and "... [a]fter the initial euphoria of anticipated cost reductions, increased access to human resources, or increased potential for innovation has subsided, these strategic offshoring decisions still have to be implemented and executed" (Kumar et al., 2008, p. 2).

In worst cases operational issues have led to reversing strategic and costly outsourcing as was the case when Lego canceled their outsourcing of production to the service manufacturing giant Flextronics in 2008 (Børsen, 2008.07.01).

Firms that persevere eventually experience that the global sourcing venture becomes easier. The initial operational difficulties that hinder the excepted benefits from the global sourcing sooner or later diminished. Few firms, however, truly understand what caused the difficulties in the first place and why or how they disappeared.

This is a case study about the global sourcing operations of the Danish video game manufacturer IO Interactive. Since 2004, they have outsourced computer animated art work to China. Their sourcing operations are frequently adjusted to improve working processes or to test new co-operation methods. IO Interactive's global sourcing operations have improved considerably since the beginning, and this research is an attempt to understand why.

## 2 **Research Question**

This research is about what makes global sourcing activities difficult or 'sticky' to transfer and how stickiness develops over time. The research seeks to illuminate what factors cause stickiness and how these factors develop. It is a longitudinal case study on outsourcing of computer animated art for video games from the Danish video game production studio IO Interactive to China. The case study aims at researching an activity on an operational level, what factors cause stickiness, how stickiness occurs and how it develops over time.

Consequently, the research question that this study seeks to answer is the following:

What factors cause stickiness in global sourcing and how does stickiness develop over time?

## 3 Methodology

#### 3.1 Research Motivation: A Narrative of How the Research Came About

This section presents the narrative for the research. The experiences that occurred during the entire process of the research highly influenced the methodology and, therefore, this short history is important for this chapter.

The research arose from an interest in the hollowing-out effects of outsourcing and how firms unlearned their capabilities by outsourcing. The inspiration came from Kotabe, Mol and Setkar's work from 2008 (Kotabe et al., 2008) about the consumer electronics companies Edison, Phillips and Sony and how they no longer knew how to make their own products after long periods of outsourcing. Also a guest lecture by a group of American political economy scholars that visited CBS in spring 2011 were asked about the future of US manufacturing by a PhD student from CBS, to which Dr. Richard Doner replied: "It's simple! If you don't make it, you can't innovate it!"

The case study and the case organization, the video game producer IO Interactive's outsourcing of art work to China, was chosen originally because they are a project driven firm engaged in outsourcing. A project driven firm would make it easier to see development over time as each finished project would be a clear milestone in the company history. The expectation was to be able to compare projects in order to grasp how the outsourcing strategy was shaped by learnings from preceding projects. The first hypothesis was that IO Interactive was unlearning valuable skills in the process, and the aim was to test this on the case findings (appendix 2).

During the first interview with IO Interactive, their sourcing history was presented with details on the difficulties they had had, and how they were overcome. It became clear that there were many aspects of the sourcing history of IO Interactive that were indeed very interesting but hollowing-out effects was not one of them. They were still better at art than their partners. However, a lot of unexpected issues emerged fairly soon after IO Interactive started outsourcing to China. In addition, IO Interactive was experimenting with different constellations on how to optimize their outsourcing relationships. It was fascinating to attempt to comprehend the adjustment process of the outsourcing and unexpected issues with regard to why they emerged and how they evolved.

This led to a thorough literature review on global sourcing in a search to make sense of the initial findings from the case study. In combining theories it became possible to begin to understand why global sourcing is difficult, and also to postulate causality: There were several causes of difficulties in sourcing an activity and perhaps one way to understand the causes was to look into basic dichotomies in the attributes of the activity.

#### 3.2 Research Philosophy

This case study researches stickiness in global sourcing operations based on art outsourcing within the case organization IO Interactive. The research hypothesizes that the attributes of activities affect stickiness and that stickiness decreases over time because of the attributes' dynamics.

On one hand the research is highly influenced by the social practice, the context, the history and the sociocultural conditions of the researched and the researcher. The data collection methodology is primarily through semi-unstructured and semi-structured interviews with the IO Interactive's outsourcing group. The outsourcing staff is reporting their interpretations of their experiences and the researcher interprets their interpretations, and as such it is not the objective truth. In addition, the dependent variable in the research question 'stickiness' is defined as the difficulties in outsourcing, and an understanding of what is difficult is highly subjective to the observer. This means that if an interviewee reports that she or he was frustrated about something, it may have appeared 'difficult' to the interviewer although issues that were relatively more 'difficult' may not have been reported because they were forgotten or 'hidden'. Therefore, the research is limited to understanding stickiness or difficulties in global sourcing in a very context-specific situation. The same applies to the independent variable: The independent variable is the outsourced activity's attributes, such as how standard or customized the outsourced activity is. The understanding of this dichotomy may also be highly subjective and context specific. A person who has worked with a process for many years may see even a very customized process as fairly standard as she or he has seen all possible variations several times, while a person who is new to a job would find a highly standardized production line process on a conveyor belt both complex and highly variable.

On the other hand, the research came about as a process of deduction and induction (and abduction as shall be explained below). The goal of the research is to understand social processes objectively in an attempt to generalize. The research question is general in nature and the model constructed for the research as well as the main hypothesis came about through a deductive process of existing theory. Therefore, the underlying assumption for the research is that the world is not entirely a subjective social construct, and that a 'mind'-independent reality does exist. The dependent variable, stickiness, is understood as something that exists in all transactions among work units in sourcing regardless of the context, social practices, history etc. The independent variables, the activity attributes, are also understood as existing always for any type of activity irrespective of the purpose of the activity, where it takes place etc.

Therefore, this study falls in between positivism and subjectivism in the post-positivistic tradition and is related to critical realism. According to Van de Ven (2007), critical realism is "...characterized by the existence of a mind-independent reality and the ability of a theory to capture partial aspects of reality" (Van de Ven, 2007, p. 39). This means, unlike positivism, critical realism accepts that all observations have errors, may be subjective and that all theory is revisable. However, unlike subjectivism, critical realism holds that 'reality is out there' and it is possible to approach an understanding of reality. In fact, the goal of science is to approach the objective understanding of reality as much as possible, although the goal can never be fully achieved. The role of scientists and science is to review and criticize earlier work in order to improve the

objectivity and understanding of reality. Consequently, objectively understanding reality is an evolutionary process of multiple individuals criticizing, deconstructing and synthesizing each other's work (Trochim, 2000).

This dialectic process is in effect what brought about the research and also what the research hopes to achieve: A small contribution to the current strand of global sourcing literature.

#### 3.3 Research Approach and Design

#### 3.3.1 Research Strategy and Purpose

The literature review on global sourcing and hollowing-out effects, the initial interview and academic discussions guided the research into the structure that it became. Consequently, the research is divided into two phases: The first phase was a stage of sense-making of what the research field of global sourcing meant. It was also a stage where the search for a suitable case to study was undertaken. The second phase was about understanding the case study and to clarify what it showed.

#### 3.3.2 Research Phase 1

This phase started out by a review of the major theories of the firm, transaction cost economics, resource and knowledge based view with a particular focus on the 'make-or-buy' decision and global sourcing. That led to the exploration of areas of global sourcing that were less well understood in the academia, and the focus became especially directed towards the operational level of global sourcing. Essentially, the phase was highly deductive in the way that ideas about what was at the core of global sourcing were taken from academia to form thoughts of where to look for unexplored territory. What emerged from the literature was that it would be interesting to investigate the hollow-out effects from outsourcing of a firm's capabilities on an operational level. As these hypotheses emerged so did thoughts on where to look for case companies, and IO Interactive was chosen because they were outsourcing a process that was both technical and creative, which means that the outsourcing would have both knowledge as well as a process element; and they were a project driven firm, which meant that it might be possible to observe changes from project to project instead of from year to year. IO Interactive, fortunately, agreed to participate.

#### 3.3.3 Research Phase 2

Flyvbjerg (2004) says that one of the main misunderstandings about case studies is that "...[t]he case study contains a bias towards verification." (Flyvbjerg, 2004, p. 309). Flyvbjerg (2004) suggests that there is a tendency in academia to perceive quantitative studies as more scientific and that case selection and case findings often lead to self-fulfilling prophesies. However, he argues that not only towards case studies but generally a bias towards verifying preconceived notion exists in academia, and that this also goes for quantitative studies. However, "...researchers who have conducted intensive, in-depth case studies, typically report that their preconceived views, assumptions, concepts, and hypotheses were wrong, and that the case material has compelled them to revise their hypotheses on essential points." (Flybjerg, 2004, p. 309). In fact, he emphasizes that the case study has a higher chance of discarding initial ideas and discovering new hypotheses because statistical surveys have no open-ended questions and face-to-face interviews that enable them to identify other variables. That is the strength of a case study, and it was exactly what

happened with this research: It soon became clear that hollowing-out effects were not significant enough to be studied in IO Interactive. They were still better artists than their sourcing partners in Shanghai and would probably continue to be so for a while. Therefore, the initial research question, the propositions or hypotheses, and the synthesis of global sourcing theory needed to be re-understood in the new reality that case organization and the case study IO Interactive and art outsourcing showed. The initial interview with IO Interactive was planned to be as unstructured as possible to ensure the possibility of discarding the entire original hypotheses. This did happen and instead the interest in trying to understand operational 'difficulties' in outsourcing emerged.

Flyvbjerg (2004) also highlights another misunderstanding of the case study that "…[i]t is often difficult to summarize and develop general propositions and theories on the basis of specific case studies." (Flybjerg, 2004, p. 311). He refers to Wittgenstein, who described the case study approach in philosophy with a mapmetaphor and says that it is better to explore the world first hand than to read a map. The case study does provide insight into understanding what is particularly contextual and how the case fits into the general population. Therefore, phase 2 was characterized by a more inductive approach on trying to make sense of 'what is IO Interactive's outsourcing venture actually teaching the global sourcing debate in a broader perspective?' The emphasis was on the variable operational difficulties, and the quest became to look for the independent variable: What caused the difficulties and why did it change?

A revisit to the global sourcing literature led to Kumar et al. (2008) and Kotabe et al. (2008), which in combination began to shape the comprehension of the IO Interactive case: Activity attributes affect stickiness. Szulanski (2000) gave guidance in grasping 'difficulty' as stickiness and adding the longitudinal perspective. Finally, Vahlne and Johanson (2011) gave reason to propose the dynamics of experiential learning. The revisit and synthesis of the existing theory to attempt to make sense of the phenomena is sometimes referred to as an abductive approach, which shall be discussed below in the 'Theoretical Approach'.

#### 3.3.4 Research Design: The Case Study

According to Yin (2009), the case study "... investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomena and context are not clearly evident" (Yin, 2009, p. 18). The plan was to understand global sourcing on the operational level, and therefore it was essential to use the case study methodology. Originally, the plan was to investigate three case studies and increase the generalization validity in the population. After the rework of the hypothesis, it was hard to identify and get case organizations to agree to participate. In retrospect it would increase the validity of the results if another case company could have been brought on after the research design was constructed. However, this may be the purpose of future research.

#### 3.4 Theoretical Framework

A new model for understanding stickiness in relation to the nature of the activities sourced globally is constructed in this research. This section discusses both the logical process that leads to and implications for constructing a separate model.

This research came about as an interaction between theory and empirical findings. The original hypothesis emerged from a review of the existing body of literature but it that was discarded after the first exposure to the case study, which showed a different world. This led to a revisit to the literature for alternative hypotheses and theory that could help in explaining what the case showed. Van de Van (2007) explains this as 'abductive reasoning'. He says that "...[a]bduction begins by recognizing an anomaly or breakdown in our understanding of the world, and proceeds to create a hypothetical inference that dissolves the anomaly by providing a coherent resolution to the problem... [and] is typically followed by a logic of testing in which the consequences of the hypothesis are derived through deduction and the consequences are tested by induction..." (Van de Ven, 2007, pp. 98). Something that was assumed to be true came out inconsistent with the original hypothesis. Abductive reasoning is conjecturing what may be an alternative explanation and synthesizing theory. The new theory is then subject to a new empirical test (and so on and so forth).

This process spawned the model that is the foundation of this research and which is called the longitudinal model for stickiness in global sourcing.

According to Van de Ven (2007), theory building involves three activities: Conceiving the theory, constructing the theory and evaluating the theory. The reasoning for conceiving the theory is abduction (as explained above), the reasoning to construct the theory is known as deduction and the logic for verifying the theory is known as induction (Van de Ven, 2007). Essentially, that process has guided this research: The abductive reasoning led to imagining a model for the causes of operational stickiness in global sourcing. Deductive reasoning resulted in deconstructing and synthesizing existing models for global sourcing, knowledge transfer theory and internationalization theory. The model is visualizing the hypothesis that emerges from combining the different theories. What the model proposes is therefore that if theory 1 says A, and theory 2 says B, then it is reasonable to assume that in combination theory 1 and 2 say C. Induction is testing the new theory through its consequences, which is the process that the case study and the analysis attempts to do.

#### 3.5 Empirical Framework

The primary data from the case study served the purpose of developing both the research question and the research design. Thereby, the risk that Flybjerg (2004) mentions may be amplified and there is a clear selection bias towards overstating relationships between the independent and dependent variable. To avoid overstating relationships, the interviews were semi-structured to unstructured (as discussed below in the data collection methods) and the case study description is kept as close as possible to the narrative with which they were presented.

The secondary data from resources available online, handbooks and newspapers served the purpose to fill in the blanks about IO Interactive, to place IO Interactive in an industry context and to test the hypotheses in its context. Flyvbjerg (2004) highlights that a strategy for selecting case studies could be one that selects a sample, which is representative for the entire population. The secondary data show the level of the representation of IO Interactive for the video gaming industry in general. In addition, the case study attempts to highlight the technical, operational and creative process in art outsourcing. To understand the context, some essential facts of the backdrop of creating video games are necessary. Therefore, the secondary data helped to explain the basics of video game projects and productions.

#### 3.6 Data collection methods

According to Kvale (1997) and others, qualitative methods are about producing discursive data embedded in individuals and exploring how individuals interpret the meanings of the discourses and develop attitudes towards them. In understanding 'difficulties' or stickiness in global sourcing in a wider context, a qualitative data collection is for instance preferred to a quantitative regression analysis.

#### 3.6.1 Interviews

The interviews were a mixture of 'semi-unstructured' and semi-structured in-depth interviews. The semistructured in-depth interview is defined as interviews based on a guided conversation about the research topic, however, with a fairly open framework that allows for conversation (Yin, 2009). What is meant by a 'semi-unstructured interview' is that the intention was to guide the interviewee as little as possible. The theme for the first interview was to present the organization IO interactive and their outsourcing. There was not much further guidance to the interview, which means that the discussion took on a life of its own.

As mentioned above, the intention was to get a feeling of how far the original research approach was based in reality while trying to illuminate the bias towards the hypotheses.

As the research approach and design took shape so did the interviews and they became increasingly structured to address the research question. The strength of the semi-structured interview is its ability to provide a narrative for the case. In IO Interactive, the interviews gave insight into concrete work flow procedures (of how the work was distributed). It also provided examples and anecdotes of events in the firm's history that illustrated performance or highlighted sequences of events. Finally, it allowed the interviewees to express personal opinions and attitudes.

#### 3.6.2 Secondary Data

The secondary data were harder to come by. The video gaming industry is rather new and not well studied. Outsourcing within the video game industry in particular is a recent phenomenon and therefore very few sources are readily available.

Two books helped in understanding the gaming industry: Wyman (2011) 'Making Great Games' and Fields (2010) 'Distributed Game Development'. Neither of the books is, however, more than a collection of good stories. Understanding the production process of a video game was crucial to adequately address the

research question; therefore, it was necessary to put together a lot of different sources to get a comprehensive view of the process. Information was gathered from various internet sites such as outsourcingreport.com (2007) and Gaming Blend (2011).

#### 3.7 Analytical approach

#### 3.7.1 Data Processing

IO Interactive participated four times throughout four months from June 2011 until October 2011 and the language was Danish. The initial interviews were done with the IO Interactive outsourcing manager and later the Lead Artist from the video game 'Kane and Lynch', whose input, as shall be seen later, became crucial for designing their outsourcing setup. The interviews were quite long and the IO Interactive staff participated much beyond what was initially planned (to the gratefulness of the researcher). The first interview was planned as a one hour lunch briefing but ended up being a 3,5 hour detailed presentation on IO Interactive's experience and history in sourcing.

This experience was repeated in later interviews, where IO Interactive extended the time available for interviews with several hours.

This had the advantage that the interviewee could elaborate in-depth on experience and processes. To shed light upon outsourcing, this appeared to be highly beneficial for the study, as the complexities in daily operations, technical procedures and the creative processes require an effort to be expressed by the interviewee and understood by the interviewer. The emphasis of the study was from the beginning on operations, and a prerequisite for processing operational data is that the technical side is understood.

Notes were taken during the interviews as IO Interactive preferred not to have the interviews recorded, and summaries were made in the short aftermath. This had both advantages and negative side effects. As mentioned by Kvale (1997), a complete transcript is to transfer the oral language to a written language: The oral language has one set of rules while the written has a different set of rules (Kvale, 1997). In a complete transcription of an oral interview all the contextual aspects are lost. This is to some extent not the same in a summary where the context of the oral language is implicitly present. The flaw with the summary style is that the emphasis tends to dwell upon what the interviewer remembers as important. However, to ensure the validity of the data, the summaries were forwarded to IO Interactive after they were completed. The Lead Artist and the Outsourcing Manager could then comment on the summaries to clarify points, which were less understood, to correct misunderstandings and to expand on issues that, in hindsight, were of higher importance.

As the summaries of the interviews in appendix 4 show this adds another dimension to the data processing: The summaries of the original interviews are available with the comments from the interviewees in the margin.

#### 3.7.2 Coding of Data

According to Yin (2009), the methodology to analyze data is through data categorization, unitization and recognizing relationships. In terms of categorization, the empirical data collected from the interviews was rearranged into the categories that related to the model constructed for the research: The longitudinal model for stickiness in global sourcing (figure 1).

The categories are based on the main hypothesis and consequently the categories are the four sub hypotheses, which are the operationalization of the correlation between the independent and dependent variable: Four different activity-attributes, stickiness and time/learning. The unitization was the process of classifying the empirical data into the different categories and finally the relationships between the categories were elaborated upon. This means that the theory guided the process of coding the data.

#### 3.7.3 Validity

Validity is about the "...approximate truth of an inference or knowledge claim of a causal relationship based on evidence that supports that inference" (Van de Ven, 2007, p. 189). Van de Ven (2007) forwards a typology for validity for causal interference: Internal validity (will the same relationship between independent and dependent variables exist with variations in the independent variable?), statistical conclusion validity (are results coincidental?), construct validity (can the results be generalized to the theory) and external validity (can it be extended beyond the organization?).

The researcher has been very aware of this threat to the validity: The relative length of the interviews counts in favor of the validity as it created a lot of raw data for which the researcher could go back and forth in the abductive, deductive and inductive reasoning. This is likely to decrease the threat from internal validity, and arguably the results would be similar if the same study is done next year in IO Interactive. Flyvbjerg's (2007) supporting arguments for the case study methodology defends the case study's scientific significance: The case study is a real example of the world, and to know London you have to look down the side streets not on the map or on a satellite photo, as Wittgenstein highlighted. Therefore, this case study is kept on an operational task level. That is where a case study, according to Flyvbjerg (2007), can truly contribute to academia as the research provides in-depth insight into the organization, and in this case on the operations of the case organization. With regard to the threats that stem from the construct validity, the assistance again comes from Flyvbjerg (2007): These threats are difficult to measure, however, Flyvbjerg (2007) highlights that statistical surveys also have bias towards verifying a hypothesis. The strength of the case study is that it is possible to identify other variables and for the case of IO Interactive's outsourcing at least this is what initially happened and which changed the research. Regarding the external validity, the final chapter elaborates upon the external validity in relation to the research question, the model and the main hypothesis.

## **4** Delimitations

The research uses the term 'global sourcing' about an activity to emphasize its operational aspect as put forward by Kumar et al. (2008). The research does not go into a discussion about outsourcing / insourcing and offshoring / onshoring. Although the case study is about an activity that was previously done by a firm in Copenhagen (insourcing / onshoring) and later outsourced to a company in China (outsourcing / offshoring), the analysis hesitates to use the word 'outsourcing' (although this is not always possible as shall be seen) as the emphasis is not on the make or buy decision (sourcing) nor on where to source from (shoring). The make or buy decision and discussions on where to source have been thoroughly studied in the academia by Hennart (1991), Dunning (2000) and others. The emphasis in this study is on the transfer process of the activity, which could be within the same company and country; the stickiness is expected to be amplified the further away from the origin the activity is transferred. However, that is beyond the scope of this study's investigation. Also, national cultures', which are studied by Stringfellow et al. (2008), are not considered separately but are implicitly part of the activity attributes.

The research focuses on the activity level in the organization. The contextual macro level (economic and political environment) or meso level (such as industry trends) and organizational factors are considered as change agents for the independent variable. However, as is discussed in the analysis, the effect of environmental variables may be even greater than considered and could effectively be discussed in more details. Time constraints for the research has not allowed for a deeper analysis on the contextual impact on stickiness.

### 5 Theory

#### 5.1 Introduction to Theory

The purpose of the following chapter is to develop a model to help understand how firms' global sourcing adjusts over time and to establish the hypotheses that support this framework. The aim is to offer an operational level model that shows how the stickiness in firms' global sourcing change and what causes the change.

The model is called the 'Longitudinal model for stickiness in global sourcing' (figure 1) and it theorizes that when activities are sourced globally, difficulties in operations emerge. These 'difficulties' can be, among other things, costs associated with sharing information, misunderstanding among business partners and other factors that hinder the firm in realizing expected benefits. 'Difficulties' in global sourcing are known as 'stickiness' (as shall be understood later). What causes stickiness is the attributes of the activity sourced globally. However, over time these attributes will change because of changes in the context, management decisions and experiential leaning and as a consequence the stickiness in global sourcing will decrease.



Change Agents

### 5.2 Global Sourcing Operations, Activity Attributes, Stickiness and Behavioral Economics

The following will explain in detail the dynamics of the longitudinal model for stickiness in global sourcing and the hypotheses that the model proposes. First, the Global Distribution of Work model from Kumar et al. (2008) is presented. Second, the Two-Stage Strategic Fit Model for KIBS (Knowledge Intensive Business Services) sourcing from Kotabe et al. (2009) is described. Third, the two models are mixed and the notion of stickiness in light of Szulanski's (2000) work is elaborated upon. Fourth, the dynamics of the activity attributes are then understood in light of experiential learning and behavioral economics especially with a

Figure 1, The Longitudinal Model for Stickiness in Global Sourcing

view to Johanson and Vahlne's (2009) Uppsala model to make a rationale for understanding how sourcing partners' relationship changes over time. Fifth, this will lead to the longitudinal model for stickiness in global sourcing. Finally, sixth, the hypotheses of the model are explained and the dynamics of stickiness and activity attributes are clarified.

#### 5.3 Operationalizing Global Sourcing: The GDW Model

Jensen and Petersen (2011) and Kumar et al. (2008) have pointed out that there appears to be a lack of studies that offer a framework for operationalizing global sourcing.

Kumar et al. (2008) argue that there are many examples of companies that have reversed offshoring decisions because the initially anticipated benefits and cost savings were outweighed by costs of work transfer, coordination and communication. Therefore, it is important to investigate the operational aspects of global sourcing.

The framework for understanding global sourcing on an operational level, which Kumar et al. (2008) developed, is based on the concept of task interdependency (Thompson, 1967; Ven et al., 1976). Kumar et al. (2008) say that interdependency is the "…extent to which the performance and outcome of one task are affected by, or need interaction with, the performance and outcome of the other task" (Kumar et al., 2008, p. 5). Kumar et al.'s, 2008 model shows that interdependency distinguished between five types: Pooled, Sequential, Integration, Reciprocal and Intensive.

Pooled interdependency means that no work flows exist between actors. There is no need to interact with your peers and there is no dependency on others in the unit. The example is a winery where grapes need to be picked and put into a basket. The activity of picking the grape has no dependency to other grape plucking activities.

Sequential interdependency is that work is directly and linearly connected to the next step, B cannot start before A is complete. Value is added incrementally in the work. Any production or assembly in the traditional sense has elements of sequential interdependency. In the winery mentioned above the grapes have to be picked before the next activity in the process can commence.

Reciprocal interdependency means that work is passed back and forth between actors before it is complete. The example is work between a subcontractor and a customer, where the customer first specifies the work to the subcontractor, who subsequently delivers to specification. The subcontractor then receives a list of corrections in return from the customer and so on.

Intensive interdependency refers to "work which is undertaken jointly by unit personnel who diagnose problem-solve and collaborate in order to complete the work." (Kumar et al., 2008, p. 6). The classic example is the lifting and moving of a sofa, where each individual carrier needs to be involved to have the task done.

Integration interdependency is about work that needs to consider integration aspects to other activities during parallel work. "For example, if the producer of an automobile part changes the machining tolerances,

or a fastener, or substitutes a different material, his automobile part deliverable may not fit with the auto body, requiring additional work or rework at the time of assembly." (Kumar et al., 2008, p. 10). Therefore, work that requires extensive fitting both during and at the culmination of a task needs to be considered in the typology.

'Stickiness' in Kumar et al.'s (2008) framework exists between sequential or parallel work to a larger or smaller scale. Stickiness is about the cost of information sharing. Kumar et al. (2008) explain this as: "... the incremental expenditure required to transfer that unit of information to a specified locus in a form usable by a given information seeker. When this cost is low, information stickiness is low; when it is high, stickiness is high." (Kumar et al., 2008, p. 13). The stickiness of information transfer includes size, tacitness and ambiguity. Kumar et al. (2008) assert that stickiness is dynamic and typically decreasing over time but are not going into details with this.

The following figure 2 shows Kumar et al.'s Global Distribution of Work model.



Interdependencies among sub activities or tasks provide an instrument for beginning to understand global distribution of work on an operational level. It highlights that separating activities globally means that the interfaces among activities come into focus. They provide a framework that helps to understand interfaces among tasks and the risks associated with them. Furthermore, the conceptualization of the 'stickiness' and 'interdependency' facilitates an operationalization of task-level analysis and research.

#### 5.4 The Nature of Activities: Global Sourcing Strategic Fit Model

Kotabe et al. (2009) develop a model for outsourcing that incorporates the elements from the major theories of the firm such as the resource based view and dynamic capabilities into firms' strategies for outsourcing. Kotabe et al. (2009) propose a 'two-step normative strategic fit model'. Kotabe et al. (2009) argue that "...[f]irms that strategically coalign sourcing strategy with KIBS attributes for each KIBS activity should perform more effectively than firms that lack such a coalignment" (Kotabe et al., 2009, p. 1).

The model is called the global sourcing strategic fit model (TSSF) and looks as follows.



Figure 3, Strategic Fit Model Source: Kotabe et al, 2009, p. 95

The coalignment of sourcing strategy with attributes should result in the correct mix of location (offshore / onshore) and ownership (outsourcing / insource). However, even when firms use 'appropriate' sourcing strategy, performance differs from firm to firm therefore firm specific factors need to be understood. The dynamic capability perspective can help in explaining different performance among firms ('absorptive capacity' and 'integration capability' may work to put constraint on or contribute to the performance).

The attributes that Kotabe et al. (2009) assign to KIBS are 'variability', 'inseparability', 'tacitness' and 'innovativeness' as shown in figure 3. The attributes encapsulate separate dichotomies within the activity. Theoretically, these dichotomies are a partition of opposing characteristics that are by definition both mutually exclusive and jointly exhaustive. This means that the attribute must belong to one of the opposing characteristics (jointly exhaustive) and can only belong to one (mutually exclusive). For instance, humans have the attribute 'gender'. The attribute gender is split into 'male' and 'female'. A human must belong to one gender (jointly exhaustive) and cannot belong to both genders (mutually exclusive). At least from a biological perspective this statement is a dichotomy and logically true.

'Variability' is an attribute for a firm's activity as to how standardized the activity is. This means to consider whether the product produced or activity performed is customized to each new case or always the same or similar. For instance, within the fashion industry most brands mass produce standardized one-size-fits-all products, while a tailor will tailor-make a suit to fit the exact specifications of the customer.

'Tacitness' refers to the nature of knowledge as either unspoken and implicitly understood among people or explicitly known and clearly codified in manuals or recipes. These two types of knowledge manifest themselves as opposite ends of a scale along the dimensions of teachability, complexity, and codifiability. "When knowledge is highly tacit, it becomes difficult to transfer or acquire because it cannot be easily articulated in a tangible form" (Kotabe et al., 2009, p. 97). Nonaka and Takeuchi's (1995) example is that "[a] master craftsman... develops a wealth of expertise *at his fingertips* after years of experience. But he is often unable to articulate the scientific or technical principles behind what he knows" [italic added] (Nonaka and Takeuchi, 1995, p. 8). Explicit knowledge, on the other hand, can be expressed in words and numbers.

'Inseparability' is about whether the consumption and production has to happen at the same time in the same space or whether time and space can be different. A surgeon 'produces' an operation at the same time and place as the patient 'consumes' the operation, while milk may be produced in a cow-shed a week prior to being poured onto cornflakes in somebody's house. Rather than being a scaled dichotomy as in the examples above the attribute 'inseparability's dichotomies 'time' and 'space' are about the importance of when and where. It is important that the surgeon is physically present, while the cow rarely finds its way to the breakfast table. The combination of two dimensions defines the degree of 'inseparability'.

The attribute 'innovativeness' is about firms' increasing development of new products and processes in joint co-operation. Innovativeness is, however, excluded from this analysis. Please see a full explanation of the attribute 'innovativeness' in Kotabe et al. (2009).

#### 5.5 Blending the TSSF- Model, the GDW-Model and Time

The aim of this research is to study how difficulties in firms' global sourcing change over time. The models presented above are relevant for the sourcing designs but neither of the models covers the research question.

The GDW model lays the foundation for looking into sourcing from an operational level, and the TSSF model frames a normative proposal for designing and implementing superior sourcing strategies for KIBS. Kumar et al.'s (2008) mention the dynamism of stickiness and that stickiness is likely to decrease over time, however, do not pursue this question. Kotabe et al. (2009) discusses strategy and not operations.

However, both emphasize the influence of the activity's attributes on operations and that the attributes change over time.

Kumar et al. (2008) show that the sub-activities interdependency cause different types of stickiness. Interdependency is essentially an attribute of the activity similar to the attributes proposed by Kotabe et al. (2009) (variation, tacitness etc...)

Kotabe et al. (2009) introduce the dichotomies of activities' attributes. The degree of the attributes' dichotomies (standardized vs. customized and time / space inseparability) dictates the strategic choice. Implicit in this raison d'être is that 'the less difficult the activity is to outsource and / or offshore the more advantages may be associated with doing so'. Kotabe et al. (2009) are concerned with dynamic capabilities

in the strategic implementation but as highlighted by Jensen and Pedersen (2011) and Kumar et al. (2008) among others, difficulties still exist after implementation. Therefore, it appears reasonable to make the assumption that the dynamics of the attributes will still affect the design after implementation.

Kumar et al. (2008) also recognize that stickiness is dynamic and will be reduced over time as work units learn to work together. Essentially, Kumar et al.'s (2008) notion of interdependency is an attribute of the activity in Kotabe et al.'s (2009) framework. This means that Kumar et al.'s (2008) model shows separate structures that represent different levels of interdependency. This will be discussed in the next section.

#### 5.5.1 Stickiness and Time

Szulanski (2000) agrees with Kumar et al.'s (2008) argument and says that transfers of knowledge are often seen as costless and instantaneous, however, in reality they are time consuming and difficult. 'Difficulty', Szulanski (2000) argues, should be incorporated into the analysis of knowledge transfer by recognizing that knowledge transfer is a process and not an act or single event. Szulanski (2000) offers a model that identifies difficulties in the different stages of a knowledge transfer.

Szulanski (2000) develops the notion of stickiness to explore difficulty from different factors at different stages in a knowledge transfer process. Szulanski (2000) uses the 'signaling metaphor' and argues that stickiness exists in source, channel, message, recipient and context. Szulanski (2000) says that a systematic way to relate stickiness to those characteristics is to see the knowledge transfer as an effort to replicate (partially or completely) an ambiguous practice. The replication requires frequent exchange of information between the recipient and the source of the knowledge. A high degree of intimacy in the relationship between the recipient and the source of the knowledge increases the possibility to resolve mismatches in the replication or the transfer related problems.

Szulanski (2000) contributes to the understanding of how difficulties in sourcing change over time by introducing 'stickiness' as metaphor for difficulties. He highlights how a transfer of knowledge process, or beginning to source an activity globally, is 'sticky' or difficult and dependent on the level of intimacy and mutual understanding between the transfer partners. In addition, Szulanski (2000) brings the longitudinal aspect to stickiness and sourcing, and shows that stickiness depends on the stage of implementation in the knowledge transfer. Finally, Szulanski's (2000) work emphasizes that 'stickiness' is not an attribute of the activity but a dynamic irregularity and will change over time. The notions of knowledge transfer and stickiness that Szulanski (2000) uses are meant for all types of knowledge transfer. This means that Szulanski's (2000) work is not exclusively related to global sourcing. However, global sourcing is certainly embraced by the concepts.

#### 5.5.2 Attributes and Change Agents

As highlighted above, consensus exists among scholars that the activity attributes are not static and will evolve over time. The mechanism for how the attributes change over time in global sourcing remains to be fully understood. The following suggests that change in the attributes may be part of conscious strategic decisions, developments in the environment and/or part of the organizational learning process.

#### 5.5.2.1 Contextual Change

The change in technology that affects the attributes is in line with the "World is Flat" argument proposed by Friedman (The New York Times, 2005.04.03) and others. Friedman (The New York Times, 2005.04.03) quotes the then CEO of Infosys, Nandan Nilekani (Infosys CEO, 2002 – 2007), who says that "... what happened over the last years is that there was a massive investment in technology... and there was an explosion of e-mail software, search engines like Google and proprietary software that can chop up any piece of work and send one part to Boston, one part to Bangalore and one part to Beijing making it easy for anyone to do remote development." (The New York Times, 2005.04.03).

These changes are beyond the control of the individual firm and long sighted. However, as shall be shown later in the discussion about the inseparability attribute and time and space importance, the trend is towards reduction of stickiness.

#### 5.5.2.2 Managerial Decision

Kumar et al. (2008) state that new advancements in ICT change interdependencies and suggest that management should invest in reducing stickiness. The new technologies allow firms to reorganize work, and firms should, accordingly, reconfigure global distribution of work both horizontally and vertically in work-break-down schedules that have minimal interdependencies.

Kotabe et al.'s (2009) model is meant as a tool for making management decisions and evidently indicates that the attribute's impact must be taken into consideration. They forward the argument that what is less difficult is the right strategic decision as it will lead to superior performance.

This means that firms should take measures to change the dichotomies of the activity attributes to reduce stickiness, i.e. recognize interdependencies among tasks and divide them in a way that leads to the least stickiness.

#### 5.5.2.3 Experiential Learning

Szulanski (2000) highlights that the intimacy among partners will change and Kotabe et al. (2009) suggest that the sourcing firm learns to work with the partner over time. This underlying assumption can be traced back to studies of rational internationalization processes and bounded rationality, forwarded by Cyert and March (1963), Simon (1983) and others, and as studied by Johanson and Vahlne (2009) in the Uppsala model from 1977.

Johanson and Vahlne's (2009) Uppsala model shows how firms by learning from their experience of operations in foreign markets consequently change their commitment to strengthen their position in the foreign market. "Experience builds a firm's knowledge of a market, and that body of knowledge influences decisions about the level of commitment and the activities that subsequently grow out of them: this leads to the next level of commitment, which engenders more learning still" (Johanson and Vahlne, 2009, p. 1412). They highlight the experiential learning process in the firm and the 2007 extension of the original Uppsala

model puts emphasis on learning with a business partner and says that business relationships can build trust and commitment between firms.

Fiol and Lyles (1983) highlight that on the activity level the experiential learning process results in routines. Johanson and Vahlne (2009), Szulanski (2000) and others suggest that routinization of the work relationship emerges as mutual trust and commitment among business partners evolves. Routinization reduces stickiness as unexpected difficulties in global sourcing evaporate.

With regard to the activity attributes, Nonaka and Takeuchi (1995), Teece (2000) and Grant et al. (2000) frequently refer to tacit knowledge as similar to 'routines'. In Nonaka's and Takeuchi (1995) book on the knowledge creating company, they describe examples of how socialization transfers and creates new routines among business partners (to be discussed in more detail below), which means that experimental learning happens simply by socializing, and in the process new knowledge is shaped. This means that experiential learning is an important change agent for the activity attributes and the result will be routines and a less sticky work relationship.

To sum up, three change agents emerge as important for changing the dichotomies of the activity attributes: The context, management decisions and experiential learning. For the activity attributes the proposed progress of the change agents is towards that which reduces stickiness: Technological advancements in the macro environment affect ways to communicate and share work over large spaces. Managers should make conscious decisions that reconfigure work-break-down structures towards reducing interdependencies and as such stickiness. Finally, routines from the experimental learning processes emerge as trust, and mutual commitment between business partners develops, which means easier workflow and less stickiness.

#### 5.6 The Longitudinal Model for Stickiness in Global Sourcing

By decomposing and restructuring the models and theories above into one, there is a chance of beginning to better understand global sourcing designs. The model below, the Longitudinal Model for Stickiness in Global Sourcing (figure 1), is an attempt to hypothesize upon the synthesis that materializes from the deduction of academia.



Contextual Change, Management Decisions, Experiential Learning Change Agents

Figure 1, The Longitudinal Model for Stickiness in Global Sourcing

The model should be read in the way that in the early stages of global sourcing stickiness is high because of higher variability, higher tacitness, higher inseparability and high interdependency. In the later stages of global sourcing, stickiness is reduced because variability has become lower and so has inseparability and interdependency while, as shall be seen, tacitness is converted to explicit knowledge and new tacit knowledge. The changes have occurred because of experiential learning between business partners, management decisions and contextual changes.

#### 5.6.1 Definitions

Stickiness is understood in the light of Szulanski's (2000) and Kumar et al.'s (2008) works. Szulanski (2000) defines the term in relation to the difficulties experienced during knowledge transfers. "Stickiness connotes difficulty experienced in that process" (Szulanski, 2000, p. 6). Stickiness exists in the source, channel, message, receiver and context and varies at different stages in the knowledge transfer. This means that a basic definition of stickiness in Szulanski's terminology is 'difficulty in various stages of a knowledge transfer that exist among the elements of the signaling metaphor'. Kumar et al. (2008) develop the notion of stickiness from the work of Szulanski (2000) but define stickiness in more general terms as the costs of information transfer between parallel or sequential tasks. In this research stickiness is therefore understood as a combination of Szulanski (2000) and Kumar et al. (2008), i.e. as 'difficulties, expected to be costly, in information transfer among sub tasks in an activity'. The costs associated with the difficulties are not measured in this research instead the research discusses the various difficulties that are shown in the case findings. It is implicitly assumed that the difficulties have caused additional costs. Also, the research does not go further into Szulanki's signaling metaphor or his different stages. Stickiness is discussed in the back drop of 'early' and 'later' global sourcing. These relative terms are related to Szulanski's 'ramp-up' and integration' stages (Szulanski, 2000, Figure 1), however, they are not identical as there are elements of the preceding 'implementation' stage as well. Nevertheless, this study focuses solely on stickiness after sourcing the activity transfer has begun.

An 'activity' should be understood in the general sense of the word and is best understood from Kumar et al.'s figure 2 above (main activity). Broadly this means that work goes into the unit and work comes out of the unit. An activity can be divided into sub tasks and shared among separate work stations. This means that the activity in this research is understood as the process of initiating, commencing and finishing work. In global sourcing where two partners work together this means that the activity is the full process and product of the interaction among the partners while the work either partner is doing is understood as sub tasks or sub activities. According to this definition firms would/could define an activity as a functional separate process such as welding, molding etc. in a smaller production line on a shop-floor routing level, or perhaps as module 1 and module 2 in a larger production (each with several welding and molding steps). This logic calls for a broader discussion about the definition and segregation of an activity, however, the interest in this research is on the interfaces between subtasks in an activity and understanding stickiness among subtasks, therefore, the focus is kept on how the firm themselves define the overall activity.

The definition of an activity attribute in this research relies on Kotabe et al.'s (2007) research. Kotabe et al. (2009) develop the terminology based on KIBS, which is considered to be a unique sector different from other information based services: The same attributes must exist for any activity and influence any knowledge transfer past the strategic choice. Any number of attributes may exist for an activity, however, these attributes have according to Kotabe et al. (2009) and Kumar et al. (2008) been found to particularly impact stickiness, therefore, this research puts emphasis on the attributes interdependency, variability, inseparability and tacitness.

#### 5.7 The Hypotheses of the Longitudinal Model for Stickiness in Global Sourcing

Based on the studies of Kumar et al. (2008), Kotabe et al. (2009) and Szulanski (2000) it is reasonable to assume that causality in sourcing exists between attributes of the activity sourced and stickiness. In addition to this, the activity attributes are not static; experiential learning, management decisions and technological developments influence the dichotomies towards reducing stickiness.

The hypothetical foundation for the above model is therefore as follows:

## 5.7.1 H1: For an activity sourced globally the activity attributes' dynamics reduce stickiness over time.

What follows logically from the above main hypothesis are the following sub hypotheses for each separate activity attribute.

#### 5.7.2 Interdepedency

According to the work of Kumar et al. (2008) interdependency is a characteristic of the activity in line with Kotabe et al.'s (2009) attributes. As mentioned above, interdependence was originally defined as the extent to which the performance and outcome of one task is affected by, or needs interaction with, the performance and outcome of other tasks. If an activity is subdivided into separate tasks it is then the degree to which these tasks are dependent on each other. In the review of Kumar et al. (2008), figure 2 shows the generic types of interdependencies and their mutual interaction. Kumar et al. (2008) propose the five types of interdependencies, pooled, sequential, reciprocal, integrational and intense, and point out that the degree of interdependency degree in 'pooled interdependency' is either low or not existing, while 'reciprocal interdependency' has a high level of interdependency. If an activity is characterized by 'intense interdependency', work is almost completely dependent on the performance of other actors in the activity. This is in line with the dichotomies proposed in Kotabe et al.'s (2009) TSSF model. The dichotomy is therefore the degree of interdependency going from low to high.

Kumar et al. (2008) show how interdependency and operational stickiness interact in figure 2. The figure indicates there is stickiness every time work passes from one task to another and that stickiness exists among parallel task. The level of stickiness is characterized by the number of times information sharing is required among subtasks. As such, it becomes evident that stickiness increases with increased interdependency. Figure 2 shows that there is twice the amount of stickiness in the 'integrational

interdependency' as compared with 'pooler interdependency' as the number of stickiness symbols increases with the next interdependency types. Therefore, stickiness is high for a high level of task interdependency and low for a low level of task interdependency.

Routines emerge in the experimental learning process on activity level. This is likely to impact interdependency in such a way that a reciprocal interdependent process begins to resemble a sequential interdependent process. Work that initially needs to be passed back and forth among peers will eventually develop informal routines and/or formal procedures where the partners already know their counter parts' requirements and therefore do not need to consult each other further. At the beginning, when a product is being sourced from a new partner it may have to be sent back and forth before it is adjusted to the necessary specifications; however, after a while the partner firm knows exactly what is required from their product. When a management consultant offers consulting to a new client, a lot of input from the client is required and the consultant will be much better at giving singular feedback as the firm's context is understood. The same procedure can be applied to the integration interdependency processes that will, increasingly, resemble pooled interdependency processes as the firms establish procedures and routines that assure minimal need for consulting with peers and eventually less interdependency and consequently less stickiness.

This operationalization of the main hypothesis leads to the following sub hypothesis:

## 5.7.2.1 H1-a: An activity sourced globally becomes less interdependent over time and consequently stickiness is reduced

#### 5.7.3 Inseparability

Inseparability is about how important it is for production and consumption of an activity to happen at the same time and place. "...[C]ustomer service call centers can be thousands of miles away from the customers they serve; therefore, they are separable with regard to space. In contrast, the customer must be on the telephone simultaneously with a customer service representative for the service transaction to occur; therefore, they are not separable with regard to time. However, customer service can be provided through other modes of communication, such as e-mail. In the case of e-mail customer service, few customers have expectations of an immediate reply. Therefore, e-mail customer service would have a lower inseparability of time than telephone customer service" (Kotabe et al., 2009, p. 7). Kotabe et al. (2009) say that when the importance of inseparability is high, production and consumption have to happen in close proximity with each other in terms of time and space. However, when time and space is not important production and consumption may just as well happen separately.

Stickiness relates directly to the consideration of when and where, in time and space, consumption of a production needs to occur. The levels of stickiness are quite tangible in terms of the inseparability attribute, as the difficulty associated with global sourcing is exactly the level of importance that space and time has in production and consumption. This means that stickiness resulting from the inseparability attribute for e-mail

customer service is low. Stickiness from IT hotline support is related to the effectiveness of the phonesupport and/or ticket system, whereas the difficulty of separating a doctor's operation from the patient is extremely high.

Inseparability of time and location is over time likely to diminish in importance. This, however, is not related to routines and procedures that are established among business partners but connected to technological advancements. It is possible to imagine that a doctor's operation may actually be stored in an IT-system and later be performed on a patient by a robot; however, such technology is not freely available. On the other hand, an airplane today can be monitored and controlled from a distance and US military's predator drones that engage in warfare operations in Afghanistan are piloted on the other side of the globe by engineers in Los Angeles.

In the process of sourcing activities globally the stickiness coming from the inseparability attribute has very high impact in the beginning of the venture and probably direct influence on strategic choice (what to offshore/onshore, outsource/insource). Over time the attribute changes but it is likely to influence stickiness to a lesser degree than other attributes as the dichotomies are less flexible and highly dependent on changes in the context. Modern video conferencing equipment makes it possible to have a face-to-face meeting with business partners in other parts of the world. This makes space less important; however, it would take a giant leap in technological advancement to have the same low importance with regard to time.

## 5.7.3.1 H1-b: For an activity sourced globally, time and space become less important over time and consequently stickiness is reduced

#### 5.7.4 Tacitness

Tacitness refers to the two different types of knowledge: Explicit knowledge embedded in manuals and intellectual properties and tacit knowledge, personal unspoken knowledge and embedded in the experience, action and intuition individuals.

Nonaka and Takeuchi's (1995) ground-breaking book "The Knowledge Creating Company" shows how Japanese companies effectively turned tacit knowledge embedded among employees in their companies' production processes into explicit knowledge. Honda developed their very successful car 'Honda City' in a process where they utilize the tacit knowledge among their innovation team members for a highly successful invention by effectively turning it into explicit plans and products.

Nonaka and Takeuchi (1995) build their work on a philosophical discussion on knowledge in a Western and Japanese context and say that Western thought tends to put emphasis on the epistemological discussion about what is true explicit knowledge, while Japanese tradition leans towards tacit knowledge and suggest that explicit knowledge is only the tip of the iceberg. Nonaka and Takeuchi (1995) suggest "...that explicit and tacit knowledge are not totally separate but mutually complementary entities. They interact with and interchange into each other in the creative activities of human beings" (Nonaka and Takeuchi, 1995, p. 61).

They develop a model for knowledge conversion about how explicit and tacit knowledge interact. The model has four modes for conversion of knowledge and is shown in the below figure.



Figure 4, Four Modes of Knowledge Conversion Source: Nonaka and Takeuchi, 1995, p. 62

According to Nonaka and Takeuchi's (1995) model, tacit to tacit knowledge is converted through socialization, which means that individuals acquire new knowledge without using language, but through observation, imitation and practice. Tacit knowledge such as a corporate culture is transferred to the individual or individuals through observation and interaction with the firm.

Tacit to explicit knowledge is converted through externalization. This is done via collective conceptualization or through a dialogue among individuals. Nonaka and Takeuchi (1995) suggest using metaphors or analogies and show the example of how Honda Civic was developed through the concepts "man maximum, machine-minimum". This metaphor made it possible for the team to unite forces from different disciplines in creating a new car. Grant et al. (2000) call this knowledge conversion for codification of tacit knowledge into explicit knowledge and suggest that be done through computer systems.

Explicit to explicit knowledge is converted through a combination of different modes of information exchange. This information is then shared through presentations, documentation, classroom trainings or through other modes.

Explicit knowledge is converted to tacit knowledge through internalization. What Nonaka and Takeuchi (1995) mean is that after learning has taken place, the knowledge becomes part of the basic knowledge of the individual. They highlight "learning by doing" as the method by which explicit knowledge is internalized. After a manual on how to operate the machine is read, this knowledge is put into practice and becomes part of the individual's routine job.

In relation to stickiness, Kumar et al. (2008) describe how stickiness is high if information required to be shared with others is tacit. Nonaka and Takeuchi (1995) do not 'explicitly' mention stickiness or difficulties, however, 'tacitly' illustrate difficulties in the conversion process with several examples. Codifying tacit into explicit knowledge will reduce information sharing costs among parallel tasks or at hands-off. The externalization conversion process requires conscious efforts by the firm and is likely to be underestimated if the level of tacitness for the activity is not well understood.

It is likely that high stickiness as a result of high tacitness will decrease over time even if the conversion process from tacit to explicit knowledge is not moving along. Two work stations learn to work together and in the socialization process they develop their own routines and procedures to solve issues and share information and, as such, new tacit knowledge. However, converting tacit to explicit knowledge requires management to be engaged in the process.

Therefore it is reasonable to propose the following sub hypothesis:

## 5.7.4.1 H1-c: Externalization and socialization knowledge conversion processes reduce stickiness over time in global knowledge transfers

#### 5.7.5 Variability

Variability is about the heterogeneousness of the activity. If the activity performed is always the same and only requires little adjustments it has a low degree of variability. If the activity performed is highly customized and different every time it has a high degree of variability.

As in the case of tacitness, the complexity of tasks is related to stickiness: If the complexity of tasks is high so is stickiness and accordingly the difficulty associated with information sharing. Even if the knowledge associated with doing the tasks is explicit and readily available, the complexity calls for efforts to train the counterpart. If a firm builds bridges, the knowledge about building a bridge can be looked up in any engineering textbook; however, for a particular bridge to be built specifications from mathematical calculations, environmental considerations and many other areas need to be measured before the bridge building can commence. Therefore, the more customized the product or service required from another work unit the higher the amount of interaction between the parties and, as such, the higher the stickiness. Homogeneous work consequently is less sticky, and it is easier (and cheaper) to separate homogeneous work from other activities and source it globally.

For products and services that are considered highly heterogeneous and make-to-order / customizable processes, measures are taken to reduce stickiness by standardizing work procedures or parts of the production. However, also experiential learning is likely to have a high influence on variability. Make-to-order products or services require a lot of implementation efforts at the beginning of a venture. All details have to be specified and basic mutual understanding among business partners needs to be reached. In the second attempt there will already be standardizations: The sourcing partner will know which issues are likely to emerge, the vendor will know what is customizable about the product or service and what has to be similar to the first endeavor for instance price, quality, delivery date etc. The second time a lawyer handles a case for a client, the lawyer already knows some of that person's history while the client knows what information is important for the lawyer etc. Also, changes in industry standards are likely to impact the variability in direction of standardization. As other firms begin to produce similar products best practices to reduce costs and improve quality emerges and are shared among firms.

It may be assumed that the standardization effects will amplify over time as a direct result of experiential learning. Management implements rules and procedures to standardize work relations among business partners. However, beyond that is an increased routinization as a result of learning to work together. Even the customizable options for a product or services become standard over time. Finally, industry wide standards eventually emerge as competition

## 5.7.5.1 H1-d: An activity sourced globally becomes more standardized over time and consequently stickiness is reduced

#### 5.8 Summary of the Hypotheses

The research's main hypothesis is that 'for an activity sourced globally, the activity attributes' dynamics reduce stickiness over time'. The four attributes that are found important are discussed above and the sub hypotheses or the operationalization of the main hypothesis are summarized in the table below.

Sub	Activity Attribute	Dichotomy	Change agent	Time	Stickiness
Hypothesis				frame	
H1-a	Inter-	Pooled	Experiential	Short term	Stickiness exists at between parallel and
	dependency	Sequential	Learning /		sequential tasks. The more interdependent the
		Integrational	Management		tasks the higher the stickiness. Interdependency
		Reciprocal	decisions		will decrease over time as the organization and
		Intense			distribution of work will be managed more
					efficiently.
H1-b	Inseparability	Time	Contextual	Long term	Stickiness is indistinguishable from the
		importance:	Changes (ICT)		importance of time and space inseparability.
		High - Low			Advancements in communication technology
		Space			decrease the importance of time and space,
		importance:			however, this process is normally slow and
		High - Low			beyond the control of the firm.
H1-c	Tacitness	Tacit - Explicit	Externalization =	Medium	High level of tacit knowledge makes knowledge
			Management	term	sticky to transfer. Tacit knowledge is transferred
			decisions /		through socialization (tacit to tacit) and through
			Socialization =		externalization (tacit to explicit). Stickiness is
			Experiential		likely to decrease over time as the knowledge
			Learning		has been transferred or/and as new knowledge
					emerges.
H1-d	Variability	Standardized -	Experiential	Short term	Highly customized activities require a lot of
		Customized	Learning /		interaction among partners early in the process.
			Management		Standardization processes soon emerge
			decisions /		through conscious business decisions, industry
			Contextual		standardization and through natural experiential
			Changes		learning.

Table 1, Hypotheses

### 6 Video Gaming and Outsourcing

The following chapter describes the case organization, IO Interactive, in its context and with its components with a particular focus on outsourcing: Video gaming industry and the video game production. It is divided into three parts: The first part explains general trends and structures in the industry. This is important to understand the differences from other businesses and to understand the contextual changes that affect IO Interactive. The second part describes the elements that go into producing a computer game: This means the team and roles, project time line and the phases in the project that are required for most projects. The third part shows the sourcing trends of the elements in a video game production cycle with a particular emphasis on art outsourcing which will be the focus of the IO Interactive analysis.

The aim is to show the case company, IO Interactive, in its context and to create the back drop for understanding the production of a video game in general and outsourcing of art in particular. The chapter illustrates that the case company IO Interactive in most ways follows the industry trend, which means that they have a high likelihood of representing the entire industry. In addition, it shows the industry trends and contextual changes that have affected stickiness in outsourcing for video game production.

#### 6.1 The Video Game Industry

#### 6.1.1 A Brief Outline

Reuters reported in June 2011 that the global video game market was valued at USD 65 billion annually. USD 29.5 billion (or 45%) of the revenue came from games sold in retail stores and about 30% from online games. The majority of the video games sold at retail stores are sold to gaming consoles such as Microsoft's Xbox, Nintendo Wii and Sony's Playstation 3 (PS3). Xbox was launched in 2005 and has sold 55 million consoles globally. There are 50 million PS3 owners and about 86 million Nintendo Wii consoles in private homes across the globe. The biggest video game firms are 'Activision Blizzard', famous for the games 'World of Warcraft' and 'Call of Duty' with a USD 4.8 billion annual turnover; and 'Electronic Arts', known for the games 'The Sims' and various American sports games, with USD 3.8 billion in turnover (Reuters, 06.06.2011)

In recent years, there has been a trend towards consolidating the games market as the development costs for successful games require substantial financial resources. A large project team working for sometimes several years is required in order to take advantage of the technical and graphical possibilities and to provide state-of-the-art games for the consoles PS3 and Xbox. The graphics, the sound and characters in a game have a high level of detail and are beginning to look increasingly photo realistic. It is therefore not uncommon for video games to require development budgets of USD 20 million to USD 50 million. Nevertheless, about 10-15% of all games produced make profits or cover development costs, which means that business risks are high (appendix 4.1).

As a result, firms in the industry are merging into larger groups, and the industry is progressively consolidating among a handful of major players (Activision Blizzard has about 10% of the world market). As

such, the industry structure is looking more and more like other consumer product industries such as beer brewing, where less and less brands are individually owned, or car manufacturing, where several brands are owned and produced by the same group. In the video game industry the group firm typically owns several brands of video games (sometimes referred to as intellectual properties or 'IPs'), however, normally each one of the IPs is handled by subsidiaries responsible for most of the production of the game.

Similar to the film and book publishing industries where producers are responsible for production as well as marketing, the group firm within the video game industry is known as the 'video game publisher' and the individual subsidiaries responsible for making a game are called a 'development studio'. The general managers of a game production are often referred to as 'producers'.

#### 6.1.2 IO Interactive, Square Enix and the Gaming Industry

IO Interactive is a video game development studio with headquarters in Copenhagen, Denmark. IO Interactive released the game 'Hitman: Codename 47' in 2000 and has since then produced several other video game titles such as three sequels to the original Hitman game, and they are planning to release 'Hitman 5: Absolution' in 2012. IO Interactive is behind other games such as 'Mini Ninjas' and 'Kane & Lynch'.

IO Interactive was founded by a group of Danish video game developers in 1998 together with Nordisk Film and was in 2004 sold to Eidos, a British video game publishing house. In February 2009 the Japanese video game publishing house Square Enix Holdings bought Eidos for the price of GBP 84 million. Square Enix Holdings own several subsidiaries that make digital consumer entertainment products. Among the more famous video games produced by Square Enix' companies are 'Final Fantasy', 'Tomb Raider' and 'Hitman'. In the digital entertainment industry it is common to repeatedly release new games with new stories and features of the same type of game (game franchise). Therefore, each year a new football game (such as FIFA 2010, 2011...) is released by Electronic Arts.

The publisher finances the development of video games; and the development studio, such as IO Interactive, is technically responsible for the full production from initial idea to launch date and after launch services. The publishing house interacts with the development studio at various stages of the development to ensure that productions are proceeding according to plan and certify quality standards. The publisher assumes the financial risks and also takes most of the profit from a game.

IO Interactive develop games for the game console industry, primarily for the game consoles from Sony, PS3, and the Xbox from Microsoft. These types of games are normally referred to as 'retail games'.

#### 6.2 The Video Game Production

The following section will describe 'the engine', which is a piece of technology that facilitates all video game production in the studio; 'the team', to highlight what roles are important, with a particular emphasis on the art creation role; and 'the production plan', with a description of the different phases and the work packages required to complete the game.

Many features in the process of making a video game are becoming industry-wide principles (Wyman, 2011) The games are increasingly narrowing down to a few types of products, where the game play is intuitively easy for the gamer to follow (sports games, first person shooter). Standards for the production of video games are also spreading industry-wide. The production plans follow the same phases, the work packages and the team sizes in the production plans vary in size but the components to support the video game production are often the same from studio to studio (Smed & Hakonen, 2003). Terminology is also becoming commonly accepted as employees of Electronic Arts and Blizzard use the same words when describing common game development elements (Wyman, 2011).

#### 6.2.1 The Engine

The 'Engine' is a system in which the video game is created. Instead of having to develop a computer game from scratch, a physical environment can be reused for the next productions. Normally the engine will provide a developer with software development tools in a visual environment to model the world, the story and the characters in the game. The engine is constructed in modular type architecture to ensure that components can be replaced or upgraded to accommodate new requirements. Once the engine is in place little coding in the system is required to develop the game as the engine facilitates a more or less completely visual environment to work in

IO Interactive has developed their own engines. The first engine is called 'Glacier' and was developed for Hitman 1. This engine was used for all IO Interactive's productions up until the work on Hitman 5 started. Glacier has therefore had a life span of 10 years and was originally developed for the Playstation 1 and Playstation 2 technology. Hitman 1, 2, 3, 4 and Kane and Lynch 1, 2 plus all other IO Interactive's games were developed on that engine. However, for the particular purpose of developing a revolutionary user experience in the Hitman 5 game, IO Interactive started to develop a new engine, 'Glacier 2'.

#### 6.2.2 The Development Team

In 1988 a flight simulator was developed for Microsoft. Their team consisted of 5 people: 3 programmers, 1 artist, who worked part time, and 1 tester. Today a team to develop a game typically consists of between 60 and 100 people and the proportion of programmers is significantly lower. The following describes the key roles and responsibilities in a normal video game project development team, with a particular focus on the artists.

The producers, sometimes referred to as production manager, project management, creative directors or development directors are technically responsible for the video game. Their job is to ensure that all the elements of the production are knit together and they are responsible for budget planning (Fields, 2010).

The game designers and writers are responsible for the ongoing story and experience of the game. Their deliverables are normally documentation and prototypes.

The artists generate all the art in the game. They are heavily involved in production and account for a large part of the work and man-hours spent on most games. The artists work with 2D and 3D art, often in

combination. Usually they are divided into character and environment artists. The former create the art for the characters in the game and the latter develop the surroundings of the game such as buildings, backgrounds and other elements in the surroundings (Wyman, 2011). On a project, there are different types of roles for artists: The art director is responsible for the overall art work: The concepts and style and the degree of details. A lead artist is the overall technical responsible for the entire art production: This person assures the overall quality and deliverables of the production team. The 'level responsible artists' are in charge of a complete level of art. Most video games have several 'levels' or sub episodes where the gamer is lead through the game in sub stages. General graphic artists are team members that create the bulk of the actual work required. Art is a major part of the game, and each element in the game has to be modeled in a 3D graphic program, surfaces have to be created, lights have to be adjusted for etc. Therefore, a project team needs a high number of general artists to complete the game (Wyman, 2011).

The programmers and the engineers are highly involved in the engine development; the bulk of their work does not go directly into the video game timeline. During project execution they help to integrate art, animation, scripting and other elements. For instance an art technician coordinates between the programming and the artist. This person will take the file containing the 3D animation of a character and make sure it appears in the game.

Other important responsibilities of a game development team include resources for quality assurance and testing, for finding bugs in the program and faults in the game play; for all sound effects and music compositions; and for marketing and PR (Wyman, 2011).

#### 6.2.3 The Project Plan

Industry standards are emerging in project plans for making video games. The project plan for video games typically follows the same procedure for every IP and for most development studios. Although the size and scope is different, strong similarities are emerging in video games development as to the project phases, deliverables, timeline, team size and budget (Wyman, 2011).

Most project plans consist of five phases: For IO Interactive, these five phases include a Concept Phase, Preproduction Phase, Production Phase and Beta Phase (or Distribution Phase). The date that the game is to be released is called the 'street date', Each phase is concluded with a quality gate, a so called Green Light meeting, where the publisher reviews the project progress, the budget and accomplishments of the development team. For IO Interactive this means a trip to Square Enix' European headquarters located

Concept (1	Preproduction	Production 3	Testing (	4 Distribution
Activities Concept Creation Deliverables Blue Print	Activities Creative Design Art work Deliverables Core Gameplay First Playable Vertical Slize	Activities Creative Design Art work Animation Motion Capture Audio and Music Programming Deliverables Alpha version Game	Activities Quality Assurance Bug fixing Deliverables Final Game	Activities Localization Marketing Distribution Deliverables Final submission Project completion Support structure in place

#### Project Schedule, Phases, Activities and Deliverables
around the world.

Figure 5 describes a general project plan for any given video game. Each of the boxes represents a phase in the plan, and each phase is completed at the green light meeting with the publisher. The activities are the core activities involved in each production phase, however, cross phase activities such as project management activities are equally important. The deliverables are the results of each project phase, which the development studio is expected to present at the green light meeting with the publisher.

The Concept Phase is the creative process where the ideas for the game are being shaped. In this phase it is decided what the game should be about and what type of gameplay will be used (for instance the 'first person shooter' style which is the mode where the player of the game will see the world as if the player is the character playing). The concept phase produces a blue print for the complete design document. This document includes a full story of the game, and examples of the art that is expected in the game (Wyman 2011).

For IO Interactive the concept phase terminates at the Green Light meeting with Square Enix where the blue print that describes all the elements of the game along with examples of the art work etc. is presented.

The Preproduction Phase consists of three main elements: Developing the 'core gameplay', the 'first playable game' and the 'vertical slice'. The 'core gameplay' is about how the mechanics of the game works. The 'first playable game' is the first version of a video game that gives a simplified impression of what can be expected from the final product. A vertical slice is a slice of the game that is completed in as close to the final version as possible (Fields, 2010).<sup>1</sup>

The general description of the preproduction phase is similar to that of IO Interactive. IO Interactive presents the first playable, the vertical slice and the core game play at the Green Light meeting and gets the 'go ahead' to full scale production from the sponsor.

The production phase is where the game is brought to its completion. This is also where the majority of the money is spent on the game and most man days are consumed. Time-wise, the production phase will typically last half of the entire project cycle. The team's resources in the phase are heavily focused on art. Roughly 40% of the man days are used on art, 15% on production, 10% on project management and 35% engineering; QA, marketing, and audio are fully staffed for the next phase but not yet involved (Wyman, 2011).

Typically, the production phase is a number of work packages or work break down schedule (WBS) elements with smaller milestones that are combined into parallel or subsequent work. The creative process often calls for reviewing existing work in the middle of the process in order to re-plan the next milestones. Functionality, art work or other elements may come out different from what was expected either because of technical issues or as a result of the creative process. This means that the next WBS element has to be reorganized

<sup>&</sup>lt;sup>1</sup> 'Vertical slice' is a metaphor used to picture the game as a layered cake. A piece of the cake will reveal what can be expected from the full cake.

to fit with the results from the previous milestone (Fields, 2010). Risk management in video game production normally incorporates as many known unknowns as possible and tries to mitigate the risks. However, in traditional project management terminology there is a lot of 'unk unks' (unknown unknowns), which make it impossible to fully assess all risks.

Throughout production, developers build improved versions of the game. At the conclusion of the production phase, the fully playable game includes art, music, and sound effects. This final milestone is referred to as "content complete". This game contains all levels with all graphics, assets and all features in the game. It will be presented at the Green Light meeting with the publisher and upon approval the studio will continue to the testing phase (Wyman, 2010).

The testing phase is about doing end user testing. Some technical elements may be further enhanced from the production phase, however, in general this phase is used to identifying defects in the game play, errors in art work and audio plus identifying 'showstoppers' that make the game unplayable in one way or another. (Wyman, 2011). IO Interactive does not have a testing phase but test the game continuously during production. The version of the game that is presented at the Green Light meeting as the edition of the game that is ready for commercial distribution.

In the distribution phase, which is also called 'the beta phase', no new elements or features are added to the game. Local content (languages and manuals) is developed in this phase and most of the effort in marketing is spent in this time period. (Wyman, 2011)

IO Interactive operates along the standard schedule; however, they have an additional phase called the 'submission phase', where the platform owners Microsoft and Sony approve the content and the publisher, Square Enix, reviews the entire project achievements.

## 6.3 Outsourcing and Art in the Gaming Industry

The following will describe outsourcing and art production in the gaming industry. First the general trends and observations are described along with some perceived motivations or anticipated benefits for outsourcing. Art for video games is presented with the particular emphasis on outsourcing.

#### 6.3.1 Industry Sourcing Trends

Outsourcing in the gaming industry only started to take off at the beginning of the new millennium. Previously, outsourcing was relatively rare and developer studios preferred to develop the entire game inhouse. Since 2002 the outsourcing market has grown fast. There are more sourcing partners to choose from, and developer studios and publishing houses are actively seeking partners around the globe (Tholons, 2009).

As the pressure for state-of-the-art graphics, animations and other technical special effects has increased so has the demand for artists, technicians and programmers. As mentioned above, the development teams have grown significantly in size and as a result it is difficult to find skilled resources readily available. Business risks are high with about 10-15% of video games breaking even or turning a profit, therefore firms aggressively need to seek ways to make productions cheaper and project schedules smaller; consequently developing studies are looking for quality suppliers in emerging economies.

Particularly the area around Shanghai has become a center for art studios, and several companies have sprung up to satisfy the increasing demand. An estimated 10,000 people are employed in greater Shanghai area in art studios for video games and animated movies. Countries such as Ukraine and India are also moving into the lucrative business and attracting publishing houses and development studios.

Today the gaming industry is offering the opportunity to outsource almost all activities within a video game development project.

Because of the increased use of outsourcing, the industry is progressively moving towards standardizing several deliverables. 'Assets' in a game are graphical art elements that are always needed are being standardized (see below). This means that the sourcing firm can expect a similar quality from any sourcing partner (Wyman, 2011).

In deciding for firms what to outsource it appears that the 'core competence' understanding is widespread. In an interview with gaming executives outsourcereport.com says that "... [it is] imperative [that] you have an accurate understanding of the core competencies of your business to accurately decide where outsourcing fits in." (outsourcereport.com, 2007). Assumedly, firms in the quest to identify their 'core competences' arrive at the conclusion that they stand out from the crowd because of their unique ability at making concepts for games while activities such as making assets for the game is something that anybody could do. Therefore, artwork has been the fastest growing business for outsourcing (outsourcereport.com, 2007).

#### 6.3.2 Art and Outsourcing

There are three types of art for a video game: Concept art, environment art and character art. Concept art takes the form of illustrations of a 2D visual representation of the idea and design of the art to be used in the video game. Concept art is typically used to communicate visions for the art to other artists that develop the environment art and the character art in 3D. Environment art is the buildings, the backgrounds and the objects in the game. Objects in the game are called 'assets' and are typically weapons, vehicles, props (whisky bottles, pictures on a wall) and all individual items that make the game realistic. The buildings and the backgrounds are often less detailed than the assets. The character art is the persons in the game, which are interacting with the gamer. These require a high level of detail and often many varieties because they change positions and contexts.

According to a report by screendigist.com, 40% of all development studios outsource to a smaller or larger extent background and environmental artwork. The internal art teams have moved to refocus their skills on developing highly value adding artwork, such as character concepts, and are beginning to act as team leads or small-size project managers for outsourced activities and teams of external resources.

Art is normally outsourced because there is a bottleneck in the project schedule of creating assets. The original project scheduling underestimated the time it would take to make the assets for the game. Therefore,

there is a sudden ad hoc requirement to outsource asset creation to an external partner as the development studio is jeopardizing the street date deadline. Art work is also outsourced when highly skilled specialist art work is required. In sports games characters have to look like the actual sports stars, and certain studios have specialized in just this type of work. Finally, volume outsourcing is happening when the development studio has planned well ahead to outsource specific art work to a partner.

The reason why especially art work is so labor intensive and requires many man hours is that the requirement for details in the art work is increasing 3-4 times with each new generation of game consoles. The increase is in 'polygon count', which is a terminology used to describe the level of details in 3D modeling. Not only the details required have increased, also the number of assets and life-like objects in the game are flourishing. This means that games for the console PS3 take ten times the amount of man days required for a PS2 game. Today 50% of the production budget goes to artwork and the global expenditure on artwork outsourcing has risen from USD 154 million in 2005 towards USD 1,078 million in 2010 (Screendigest, 2010).

# 7 Outsourcing and IO Interactive

The following chapter presents the case findings: Art outsourcing in IO Interactive. The chapter is constructed of the raw data collected at IO Interactive. The structure of the interviews developed from meeting to meeting and became more precise on harnessing information to test the main hypothesis in general and the four sub hypotheses in particular. The interviews were with the IO Interactive outsourcing manager and the Lead Artist of the video game 'Kane and Lynch'. Both people have been instrumental and influential in developing IO Interactive's outsourcing design. The interviews were supplemented with email correspondence and phone discussions that helped to clarify essential parts of the details. For interview summaries and comments by IO Interactive see appendix 4.

The chapter starts by presenting the narrative of the historical background and events that lead to the constellation that IO Interactive have for outsourcing today. As the story unfolds the chapter organizes the information about IO Interactive's outsourcing into separate categories that describe themes from their outsourcing venture (partners, daily work, the creative process)

IO Interactive is outsourcing various aspects of their production line such as parts of the art work, animation, sound & audio, motion capture and localized material. Nevertheless, the most wide-ranging activity that IO Interactive is sourcing is for art work during the production phase.

The workload of art in IO Interactive is the largest percentage of the entire production phase in terms of man days spent, and art also takes up take up almost half of the entire project budget<sup>2</sup>.

## 7.1 The Outsourcing Idea was Spawned

In IO Interactive the idea to outsource was spawned during the production of the fourth game in the successful video game series: Hitman. The fourth game in the series was called 'Hitman 4, Blood Money'.

Originally, during the production phase, one person was responsible for the graphic of one level. That person would have 'supporting artists' to help finalize the graphics for the level as the work and timeline was more than what one person could manage. The supporting artists were artists with less experience. They were placed with different level-responsible artists on a need-to basis.

According to IO Interactive, this initial model was an internal way of 'outsourcing to coworkers'. The levelresponsible artist would make the specifications for a graphics object (perhaps in the shape of a real picture or a drawing with a thorough explanation of characteristics), which for instance could be a sofa or a whisky bottle. The supporting artist would then create the 3D model in a 3D animation software program. Once the 3D model was finished the artist would need to add textures to the 3D model to make it look photo-realistic. In addition to this, light and shadowing along with physical attributes of the element would be added in the

<sup>&</sup>lt;sup>2</sup> It was not possible to get information about the actual expenses on outsourcing from a project schedule.

graphics editing software tools. Finally the model was imported into the engine, where the game is being put together.

The requirements for art work were high and it soon led to an internal struggle to secure the necessary resources. There was an excess demand for the supporting artists and it was not possible to train new staff fast enough for the project. This meant that the acute need for resources internally forced IO Interactive to begin to seek support from outside. "At that time it was because we had problems meeting the demands for content, and we thought 'what can we do to make it?'" (appendix 4.2). To address this issue they hired Christine Thaarup, who already had experience with animation studios in Shanghai, China. She had been involved in Danish animation movie production where Chinese partners had been used for graphic production. Christine Thaarup was sent to China to single out potential partners and as a result the first connections were established to a partner studio. At the beginning, the outsourcing strategy was premature and not well thought through. It was based on a specific requirement for resources to achieve projected milestones. The process was the same as with the 'inhouse outsourcing'. Individual tasks from level-responsible artists were sent to the Chinese partner sporadically and on a case-to-case basis.

These outsourcing processes started at the end of the Hitman 4 production and at the beginning of the 'Kane and Lynch 1' production. Kane and Lynch is another franchise game from IO Interactive, which originally was launched in 2007 and which targeted a more mature audience with rather politically incorrect [anti] heroes.

Martin Guldbæk was the art director at the beginning of the production for 'Kane and Lynch'. He had an ambition to find out how to use the outsourcing partner more effectively, and the idea of establishing a permanent representation in Shanghai with the purpose of facilitating the work flow between Shanghai and Copenhagen emerged. Peter Eide joined the 'Kane and Lynch 1' production and became the Lead Artist. Martin Guldbæk saw the potential positive impact of outsourcing on costs and scheduling, and during the initial project team meetings they told their artists "... to consider how much outsourcing can help you and what tasks you can outsource" (appendix 4.2). The 'Kane and Lynch 1' was successfully launched for PS3 in late 2007. The successful launch and high profitability because of a relatively short production timeline triggered plans to start work on a sequel immediately.

A strategic decision meant a standardization of processes and project timelines and led to a complete redesign of the 'Kane and Lynch 2' planning.

Early in the outsourcing process IO Interactive decided that they would not seek to take over a Shanghai graphics studio because of problems with ownership, governance and employee retention together with other issues primarily related to complications with operating in China (appendix 4.2). Instead IO Interactive decided to set up the Shanghai office. The purpose of The Shanghai Office was to coordinate the activities between the partner studios and the artists in Copenhagen. Today the Shanghai hub has become a Square Enix office (and not specific to IO Interactive but a liaison office for all Square Enix' studios). Christine Thaarup is the General Manager and has a permanent staff of seven in Shanghai (appendix 4.1).

As indicated by the Level Responsible Artists, the experiences with outsourcing were not necessarily positive at the beginning of the process. The atmosphere among the Danish artists was often negative and they said that "... we have to redo the entire work anyway once it returns from China". IO Interactive explains that it is often difficult for one artist to understand the work of another artist. Some managers, Martin Guldbæk and Peter Eide, were less pessimistic about the results, and it was simply not possible to hire enough artists in Denmark. Therefore outsourcing was a necessity.

#### 7.2 A New Strategy

As strategy changed towards standardizing timelines and planning, the 'Kane and Lynch 2' production plan came under tremendous pressure. At the initial meetings there was an uproar among the team members who did not see how it was possible to realize the new timeline. The lead artist said that the timeline is not possible unless we outsource all graphics to China. Senior management responded that "... in that case, that's what we have to do" (appendix 4.2). The result of the meeting was a completely new philosophy of how to engage with the Chinese partners and a subsequent reconfiguration of the project plan.

The base of the new idea was aimed at how to avoid running out of resources late in the process. The way that IO Interactive decided to tackle this was by outsourcing entire levels instead of sending individual tasks to the partner studio. They did this by making complete levels which only consisted of white boxes that had the purpose of giving the Chinese artist an idea of what the level was supposed to look like and how the player was supposed to pass through the level. In addition, they would supplement the white boxes with real pictures of what the environment should look like together with a description of the level. The game 'Kane and Lynch 2' plays out in Shanghai, and IO Interactive's staff consequently went around Shanghai and took photos of railway tracks, warehouses etc. to give the Chinese partners an idea about what was expected from them (appendix 4.1)

The Hub in Shanghai was established in this period with the specific purpose of quickly responding to queries from the partner studio. Martin Guldbæk was present in Shanghai, which was a great help as he had been Art Director for 'Kane and Lynch 1' and therefore knew exactly what was required.

"We didn't take into account that the partner could be delayed" (appendix 4.2). The large amount of graphics outsourcing meant a higher risk for delays and IO Interactive felt that it was a continuous process of learning. At the beginning, IO Interactive was delayed but later in the process their partners were delayed. This led to resources being idle at critical times as, in many cases, one cannot start working on a task until the preceding task is finished. It soon became apparent that the Chinese partner did not understand what IO Interactive required from them. To begin with, the Chinese partner did not realize that IO Interactive saw the work as semi-finished, and gave feedback on general issues. The Chinese partner saw the list of general issues as a final checklist for completing their work. IO Interactive expected that in addition to the general issues, the Chinese partner would work on the details that would make the level seem realistic to the end user. This misunderstanding led to time delays, and often the staff in Copenhagen was sitting around waiting

for work. In retrospect, IO Interactive should have incorporated longer buffer zones between the tasks to avoid project delays. The tight schedule and misunderstandings led to prematurely approved levels and consequently not optimal quality.

While the colleagues in the 'Kane and Lynch 2' production were struggling with getting the design for their outsourcing into place, the production for "Hitman 5" was already well on the way. The Hitman series is IO Interactive's flag-ship and was not under the same time and cost restrictions as 'Kane and Lynch 2'. 'Hitman 5' started with the original concept of sourcing individual elements from the Chinese partner instead of entire levels. The experience from 'Kane and Lynch 2' came at too late a stage and it was not possible to change the timeline for the Hitman project. To incorporate the necessary buffers, which was the lesson from the 'Kane and Lynch 2' experience, would have meant reshuffling resource planning, which was not an option.

As a result, today IO Interactive operates with two models for outsourcing: The 'Kane and Lynch 2 model' (KL2) and the 'Hitman 5 model' (HM5). In KL2 there are general guidelines for concepts and workflows. In HM5 there are specific guidelines for each level and each element in the level. The workload for IO Interactive's colleagues is far less in KL2 than in HM5. "...The comparable example [to HM5] is a teacher teaching a whole class of students [KL2] as opposed to a teacher teaching each student individually [as in the HM5 model]... If I were to choose between the two models, I would choose the KL2 approach, howe ver, the quality is better in HM5" (appendix 4.2).

As mentioned above there was still an issue regarding expectations as to the partners' work. However, late in the process a mutual understanding started to emerge and the Chinese partners began to deliver complete levels. An example of this was when one of the levels was being played out in an apartment in Shanghai, which belongs to the Chinese girlfriend of one of the main characters. IO Interactive forward ed the 'white boxes' together with pictures of a mid-twenties Chinese girl's apartment. The partner artists realized, by themselves, that fashion magazines should be lying around on the table and stockings should be lying in the corner. "The partner began to understand how to free-style within the general guidelines" (appendix 4.2). The general guidelines also aim at securing that the opposite problem does not occur where the partner spends an unnecessary amount of time on elements that have little or no significance nor adds value to the game.

#### 7.3 The Chinese Partners

IO Interactive works with two graphics studios in China: Mineloader in Shanghai and XPEC in Suzhou. "The first studio we worked with [Mineloader] had accepted too much work, therefore we had to move 50% of the work to a new studio and have it up and running in no time" (appendix 4.2). Fortunately, it went rather well. The decision to take on the new partner XPEC in Suzhou was taken only two weeks prior to the colleagues sitting physically in the studio in Suzhou.

Peter Eide spent three days at XPEC to explain how IO Interactive worked and what was required from their side. "... I sat in front of the computer and showed how we make a full level. What they did, was simply to film the whole thing and in the end it was a great success story" (appendix 4.2). Peter Eide explains how it

was the sense of urgency that made people work so concentrated and intensively. XPEC was a competent partner with competent staff that wanted to make it happen. They did deliver good quality, however, plenty of minor issues emerged especially structural issues in the communication process. An effective quality filter was missing.

IO Interactive had already established a mutual understanding of working together with the original partner, Mineloader, in Shanghai where a small group of dedicated artists are working for IO Interactive only. This means that IO Interactive's colleagues know the first name of their counter parts in Mineloader. IO Interactive does not know the individual artist in XPEC and the tasks that they send to Suzhou are distributed among 20-30 Chinese colleagues. "This means that if something goes through their quality filter and our artist gives feedback in one area to one of their artists, the exact same error may be repeated by another of their artists" (appendix 4.2). This often leads to frustration.

The communication between IO Interactive and XPEC goes through a project manager in XPEC. The project manager distributes the work and receives the individual work from each artist before returning it to IO Interactive. In the case of IO Interactive returning with feedback, the project manager in XPEC forwards it to the original artist or a new artist to fix the error but does not necessarily communicate to the entire team. With Mineloader the Danish artist knows the Chinese counterpart and can direct the feedback to the individual artist although the formal communication goes through a project manager as in XPEC. "If it is about getting a metal surface to look metallic, we will write to the project manager that the 'metal-brothers' know how to do this!" (appendix 4.2).

There are often misunderstandings in the communication process. An amusing example of this was when an IO Interactive colleague enthusiastically exclaimed "this is the shit!" in an email to China to express gratitude that the Chinese were exceeding expectations. In China, unfortunately, the 'the shit' was not understood correctly, in fact, it was understood completely opposite.

## 7.4 The Creative Process

IO Interactive was one of the first Western clients of Mineloader and it took some time to reach a mutual understanding of the work. All in all, they feel that they were very successful in getting artists with high technical capabilities. Making art for a video game is a highly creative process, and especially the partner Mineloader has a complete understanding of what is expected from them, but it was not always so and took many rounds of frustrating feedbacks before the Chinese partners finally understood what was required. After 5 years of partnership, however, they have a complete mutual understanding of work routines and processes.

IO Interactive mentions that this is also reflected in the wider industry today: Even when setting up a new partnership, most firms have experience working with Western clients and have a solid understanding of what products are expected from them.

At the beginning, Rasmus Poulsen, the art director at IO, joined the meetings with Mineloader in Shanghai. He showed them examples of his graphics so that they could understand the work they needed to complete. "The best way to make them understand is to draw in while they are watching " (appendix 4.3)

In comparison with art from Western sources, Chinese artists tend to deliver exactly what they are asked to do, while Western artists do not like to be told the specifications of the art in details. A Danish artist would prefer to 'free-style' and put her or his own touch on the asset; this means that IO Interactive does not know exactly what to expect in return. The Chinese style of working is therefore sometimes an advantage because they stick to what they were told to do. However, in many cases they would misunderstand and focus on what they were told as opposed to what makes sense. Early on, they were averse to making more reasonable decisions by themselves, which is a necessity in creative art work. An example of this, for instance, would be that a graphic element was specified as maximum 1,500 polygons (which is the count of the details in the element and eventually adds to the memory required to display the object). In return IO Interactive would receive the element with exactly 1,500 polygons while seen in retrospect the element could easily have been created with only 800 polygons and still achieve the same result. Also, if IO Interactive did not specify maximum count of polygons, sometimes they would provide 800 where 1,500 were indeed needed. "Description was more important than reason" (appendix 4.3).

In the KL2 model, it is necessary for the Chinese freestyle. Generally, there is always a 2D drawing example of the asset or environment that they need to create, but with the KL2 model there are a lot of low level creative decisions to be made. For the game Kane and Lynch 2, it eventually worked out well, and part of the reason for the successful outcome was the adjustment of the style of communication: IO Interactive noticed that if they were very concrete and direct in their specifications they would get exactly what they asked for. If it was only loosely communicated, the Chinese partner would be uncertain about the exact requirements and eventually make their own choice. This taught IO Interactive how to make the Chinese improvise: Instead of concrete specifications for the art work, IO Interactive started to give Mineloader and XPEC loose handouts. By doing so they got much better results as the Chinese were fully capable of making creative decisions.

Today, Mineloader and XPEC have become much better at understanding the requirements. There are even examples in the HM5 model that the Chinese partner gives better solutions than what was originally specified. In the above example with polygon counts sometimes the 1500 limit of polygons will now come back with only 800 used while the result is perfect. This, according to IO Interactive, is a clear sign that they are beginning to understand each other better (appendix 4.3).

#### 7.5 Timelines

The Chinese partner will be told two to three months in advance what work is needed. They can then schedule their resources accordingly. In reality, however, they can only start to plan their resources effectively once they receive the actual specifications, which is normally about one week beforehand for work that may require 20-30 man months' worth of work. They are expected to return the work 6-8 weeks later.

At the beginning they had several stages of submission. There was a first stage, second stage, final approval etc. However, this system was abandoned over time, and instead IO Interactive expects that the product which they receive from China is close to the final submission. There is about one week for adjusting the results. This is not much of a buffer zone in the project schedule if major changes are needed. It is thus of crucial importance that the Chinese partners understand the requirements when they receive the specifications.

IO Interactive will in certain cases have dependencies for the submissions, which means that 'A' has to be completed and approved before 'B' can start. This is also a way for IO Interactive to ensure that their partners have indeed understood the work requirements. If work task 'A' is not fully satisfactory then at least they can correct this before 'B' commences, as the partner probably did not have the full understanding of what was required. As such, there is a constant learning element in all interaction among the partners (appendix 4.3).



Figure 6, Feedback loop

The above figure illustrates how the work dependencies help to adjust the mutual understanding of the entire work required.

## 7.6 Daily Operations

In the daily operations, work bounces back and forth automatically among the artists in Shanghai, Suzhou and Copenhagen. Physically, the communication between the parties goes through the files that are uploaded in the systems and pushed or pulled forward towards the partner. The artists with IO Interactive will send specifications for everything they need at the beginning of a milestone (as in the HM5 model) or for the entire level (as in the KL2 model). The Chinese project manager will subsequently distribute the work among the available resources / artists. Then the actual work is done: The Chinese artist will develop the asset or art in a 3D animation program together with textures and surfaces in the appropriate graphics program (appendix 4.3).

Upon finalizing the work, the Chinese artist will then upload a file to the server from her or his workstation. The project manager with the Chinese partner will check the work, approve it or return it to the artist for further work. Once it has been approved, the project manager informs IO Interactive that new content is available. The file is then 'pulled' on request to a server in The Hub in Shanghai and automatically synchronized to Copenhagen. Then the artists in IO Interactive can "pull" the latest version from the server to their workstation on request. Once a work is finished, IO Interactive in Copenhagen will push a mirror image of the complete game in the other direction, which will then finally be replicated to the Chinese partner. The setup looks as in the model below (appendix 4.3).



Figure 7, Daily Operation

The artists in IO Interactive will receive art in various stages of progression. In the early stages of completing the asset, the project manager is not expected to check the work in detail. There will be some corrections from the lead artists in IO Interactive. However, as the art progresses towards completion, the project manager is expected to check the quality. In the daily operations there is, as mentioned, no direct communication among the artists. However, The Hub in Shanghai has an employee dedicated to ensure quality. To that end, the person samples some pieces of art to ensure quality. If the work is not satisfactory the person communicates with the Chinese counterpart. 'Sean' is employed for this purpose. He is a local English speaking Chinese and therefore he can communicate directly with lead artists on either side of the partnership when something is not working as it should (appendix 4.3).

# 8 Analysis

This chapter tests the sub hypotheses and the main hypothesis by interpreting the case findings. This is done by analyzing how the dichotomies of the activity attributes have developed over time and how it has influenced stickiness. Each sub hypothesis is handled separately and the manner by which they are discussed is to, a), first interpret the nature of the activity attribute and its dichotomy; b), then the development over time and its influence on stickiness is discussed. Based on these findings, c), the sub hypothesis will be verified or discarded. This procedure is repeated for each sub hypothesis. This leads the research to conclude on the validation of the main hypothesis.

## 8.1 Testing of the Hypotheses

# 8.1.1 H1-a An activity sourced globally becomes less interdependent over time and consequently stickiness is reduced

#### 8.1.1.1 Independency and the Dichotomy

The interdependencies in art work sourcing are best understood by looking into the actual work flows and how the work packages are distributed among the partners. The exact technical work flow was described in the above figure 7; however, this only shows the planned process while the details in various setups will explain the nature of the interdependencies.

There are different setups for the workflow process between IO Interactive and their partner studios XPEC and Mineloader. In addition to this, the processes in the production of the video game Kane & Lynch 2 (KL2) and Hitman 5 (HM5) are different. This means that the case findings show two types of interdependencies: Interdependency with different partners and interdependency with different games. Figure 8 gives a visual overview of the different types of interdependencies involved in IO Interactive's graphic outsourcing.

The two top quadrants show the interdependencies that describe the different types of workflow with the two suppliers. They are named the XPEC Model and the Mineloader Model. The bottom two quadrants show interdependencies specific to the game (not related to the supplier): The HM5 Model and the KL2 Model.

This means that the model should be understood in the following way: The top two quadrants are about the differences in interdependency between the two suppliers, XPEC and Mineloader, and the bottom two quadrants are about the differences in interdependency between the two games Kane and Lynch 2 and Hitman 5.



Figure 8, The Supplier – Game Souring Matrix

In the top left quadrant, the XPEC model for interdependency shows how work follows direct and formal procedures. Work goes through the project manager, who distributes and verifies the work of the artists in their team. In the top right quadrant, the Mineloader model shows that the interdependency is different: The partners have worked together for a long time and a mutual understanding has developed between the artists. The Chinese artists in Mineloader's core team are known by name by the IO Interactive partner (but only the core team). The core team knows exactly what is required from her or him. There is little need for inspection of the asset by the project manager and only few adjustments to get the work done is needed.

The formal workflow procedure is illustrated in the model that describes the daily operations in the previous chapter. The daily operations model shows that there is no direct communication among the artists on IOs side and the Chinese partner. The communication occurs through the art files that are pushed and pulled back and forth between the systems plus notes in attachments to the files. There are several assets to be created and approved and because of the tight schedule it is impossible for the partners to discuss each object.

Therefore, the notes, comments and check lists made by the IO artists are crucial for communicating modifications to the completion process. The partner has to have an almost complete understanding of what is required early in the relationship. This illustrates well the interdependencies and their differences for the two suppliers. In the XPEC model the project manager becomes a focal point as the quality filter. It is the role

of the Chinese partner's project manager on the side to verify their work. It is also the project manager who is in charge of communicating back and forth if corrections or misunderstandings need to be distributed among the teams. This model assures that guidelines are followed and that quality standards from the supplier side are met. However, as the model indicates there is a serious risk of creating bottlenecks around the project manager or that the project manager prematurely approves quality.

In the Mineloader model the formal communication works the same way as in the XPEC model. However, dotted lines indicate that the project manager is not required to the same extent in the process as the Mineloader employees are already familiar with the requirements from the level responsible artist at IO. There is not the same dependence on the project manager as a portal for quality assurance and feedback to IO. In this model less information is lost or stuck in the work flow process. Issue solving may be done quicker as each counterpart knows who to contact directly although in reality that rarely happens. The risks in the Mineloader model are that the flexibility to assign work will be less as they cannot easily switch the work among artists on the supplier side. Over time there will also be a preference among people working together and they start to specialize and develop a tacit mutual understanding of how work is supposed to be done. This means that the skills of the suppliers' artists become highly specific to the customers demand. The above example with 'the metal brothers' is positive in the way that both IO and Mineloader know who can get the required metal surface work done correctly, while the negative side effect is that perhaps no one else can deliver the same results. In addition, if the supplier's artist is not available for the customer, the level responsible artist may have to teach the new artist from scratch on how to work.

With regard to the different models used in game design, the HM5 model (or the traditional way of communicating) shows the reciprocal interdependency of the work and the continuous communication. In this process there are several small interfaces as the artists on supplier and customer side are incrementally reaching the desired result. Each asset is separately specified down to the last detail and accompanied by concept art or photos so that the partner always has a frame of reference. The level responsible artist at IO is clearly in control of the process and can better govern the partner on how to complete the task.

As indicated by Peter Eide, the HM5 approach means that work will eventually be perfected as a result of the many interactions. The model is highly flexible and ad hoc changes are possible. However, what stands out from the figure are the numerous interfaces. The 'stickiness' symbol visualizes the amount of external and internal communication between project manager and artists (similar to the XPEC model), which highlights the many steps required and many people involved to finalize the work.

The KL2 model shows that there are few communication steps involved; however, few steps require a high level of engagement from both sides (therefore the larger comparative size of the stickiness symbol). During the communication all information needs to be brought forward, all areas that are unclear need to be understood and clarified and all parties need to agree on the general guidelines. The interfaces are few (at best only one) and the resources can be aligned and assigned accordingly. The work is sent off and is expected to come back complete. The risk is that stickiness may emerge in this process if the initial

understanding is not completely clear. It is required to explicitly modularize the entire graphics development of a full level. The KL2 model shows that the more effort is spent on the few communications among the parties the higher quality can be expected. But the flexibility of the model is questionable as resources are assigned to a specific level with a specific timeline. As in the case of 'Kane and Lynch 2' it is not easy to change resource assignment if timelines changed. Staff involved may have been assigned to other customers or other productions. In addition, the level responsible artist is less in control of the development and the product may not live up to the expected quality. As indicated by IO's experience, it takes some time, efforts and investments to realize the potentials of this constellation before a mutual understanding will emerge. The artists have to behave like artists and freestyle to complete the semi-detailed specifications.

The KL2 model is preferred by IO: It is a lot cheaper and faster if handled properly. KL2 was an experiment as the timeline was under pressure and the 'Kane & Lynch' IP did not have the same quality requirements as the flagship IP 'Hitman'. As mentioned by both Peter Eide and Peter van Aller Rydmann, the KL2 model worked out very well in the end and 'should' be the model for the next games.

#### 8.1.1.2 Interdependency Dichotomy Dynamics and Impact on Stickiness

The findings above show that both the XPEC and the Mineloader setup together with the KL2 and HM5 models are characterized by reciprocal interdependency in Kumar et al.'s (2008) GDW model. Work is passed back and forth among peers several times until completion. This means that in the nature of the work there is a relatively high degree of interdependency in the task outsourced to other tasks in the activity.

However, the case study also finds that there has clearly been a development over time. As IO Interactive noted, the first attempts at outsourcing were premature and not well thought through, and a lot of rework needed to be done by the staff in Copenhagen. At the time of the research this was no longer the case and IO Interactive was already experimenting with new setups to get the most benefits from the partnerships.

The KL2 model emerged as a response to the learnings from the original Kane & Lynch game. There was a pressing urgency to find a method that would make it possible to create a lot of art in a short time. The management decision to outsource entire levels was the response to this. The aim was to reduce timelines because of the high amount of interaction that each asset required if handled individually. By implementing KL2 other issues emerged immediately such as how to make the Chinese understand that they were no longer required to do exactly and only what they were told but instead freestyle an entire level. This was a mutually experiential learning process, where IO Interactive needed to understand how effectively to communicate with the Chinese and where the Chinese partners had to grasp the creative process of finalizing a level. The outcome on KL2 was successful and clearly the interdependency from Kumar et al.'s model was reduced: There were fewer interfaces between IO Interactive and XPEC or Mineloader. Stickiness, in relation to the interdependency attribute, is related to the number of times that the partners interact. Therefore, stickiness is less with KL2.

In HM5, IO Interactive returned to the old version with high amounts of interaction. HM5 started its large scale outsourcing after KL2 but the learning experience and management decision was not incorporated into

the project schedule. The HM5 model was less risky for the important Hitman 5 game. However, the sourcing partners were the same and therefore they could have worked with the KL2 model.

One of Mineloader's first exposures to Western clients was IO Interactive, and both companies learned how to work together. This has had a direct impact on the number of interactions in both the KL2 or HM2 models. There is less need for modifications and the quality that Mineloader delivers is high and according to or exceeding expectations. This is the result of learning to work together and the learning has reduced the reciprocal nature of the interdependency towards a more sequential process.

The same is the case of XPEC, however, to a lesser extent. XPEC is a bigger company and therefore the learning is not with the individual artists, as is the case with 'the metal brothers' in Mineloader. Instead the learning is to avoid having excessive communication back and forth by formalizing the procedures: Establishing effective quality assurance, introducing naming conventions etc. The role of the project manager becomes much more visual in this setup as it is the responsibility of that person to ensure that procedures are followed.

This means that in general the management preferences and decisions go in direction of reducing the number of interfaces with the sourcing partner. The experiential learning reduces the interactions required because the partners learn to work together and formal procedures are established. Interdependency decreases in time because of management decisions to formalize procedures and because of experiential learning. Consequently stickiness is reduced.

#### 8.1.1.3 Conclusion on H1-a

The results from the findings confirm the sub hypothesis show that interdependency decreases over time and consequently stickiness becomes less.

It is shown in the models that Mineloader and IO Interactive by working together for a longer time have reduced the number of interactions through experiential learning and management decisions to reduce interactions (or stickiness). Consequently the interdependency has moved from a reciprocal design towards a more sequential design (from Kumar et al.'s, 2008, model in figure 2). This is also seen with XPEC, however, they have worked with IO Interactive for a shorter period, and XPEC is a larger company. Therefore, the reduction in interdependency comes from formalizing work procedures.

In the models that relate to the games, KL2 and HM5, the mature approach from KL2 shows that the decision to reduce interdependency by going from a clearly reciprocal interdependency towards the sequential interdependency reduced overall stickiness, although new and unforeseen stickiness emerged (issues with check lists and buffer zones in the scheduling). The result of IO Interactive's learning process is that the KL2 is preferred; however, this process still needs to be perfected as they are not yet ready to jeopardize quality from their flagship IP Hitman.

Although it is not the original purpose of figure 8, the resemblance to the longitudinal model for stickiness in global sourcing (figure 1) should be highlighted: If the top two quadrants are looked upon exclusively, they

illustrate a development from early to later global sourcing: The XPEC model shows that in early global sourcing interdependency is high, reciprocal and the degree of stickiness is equally high. In the Mineloader model, IO Interactive has a long relationship with the partner and therefore it shows a later stage of global sourcing. Interdependency has been reduced towards sequential interdependency and consequently stickiness is less. The same applies to HM5 which is the traditional way of interacting with the partner. HM5 shows a high degree of interaction, which means a high level of interdependency and stickiness, while the mature model for KL2 shows that interdependency is reduced to become almost completely sequential and consequently stickiness is less frequent.

# 8.1.2 H1-b For an activity sourced globally, time and space become less important over time and consequently stickiness is reduced

#### 8.1.2.1 Inseparability and General Case Study Findings on the Dichotomy

Arguably, the consumption of the art produced is perhaps, in its essence, occurring during game play by the end user. This is the point in time when art is appreciated and interactively used with all other elements in the game. This definition provides little inside information for this research. However, an art asset is also a subcomponent in the project based production process of a video game. As such the art work is 'consumed' upon approval by the level responsible artist.

The art work is part of a project schedule and timeline and therefore the discussion about the importance of production and consumption is inevitably about project scheduling and planning. As mentioned above Mineloader or XPEC receive the specifications of the actual tasks and have one week to plan the work for the next 6-8 weeks. In return the feedback and adjustment period is about one week as well, before the work must be completed. An illustrative example is shown in the figure below (this is a revised example from Fields, 2010. It has not been possible to gain insight into IO Interactive's actual milestone planning).



Inspired by Fields (2010), p. 16

The above example shows a milestone that begins the 1/1. The first task is to send the specifications to the Chinese partners. By 7/1 the work specifications have been reviewed and are distributed among the resources planned for the project. Six weeks later, on the 11/2 the work returns to IO Interactive and one week of feedback and reviewing follows. In the meantime new work is sent to China for review by the Chinese management.

The example illustrates the importance of timing. There is a one week buffer zone only in the scheduling where modifications to the work can be made. From a project management perspective this means that there is a high risk of missing deadlines.

The mitigation measures from IO's side are to have open issues clarified as much as possible before work commences as this will decrease the changes required after first submission and when the work is in the feedback loop. The milestone and work planning is constantly adjusted to fit the experience from the previous milestone. Fields (2010) emphasizes the importance of constant reviewing and adjusting the planning of work based on the experience from the preceding milestone and says that "...[t]his step of the process is really an exercise in educated best-guessing" (Fields, 2010, p. 17).

The experience from KL2 was that IO Interactive underestimated the importance of allowing buffers in the schedule for adjustment of the work, and consequently the quality suffered. In the HM5 model there are more individual buffers, and since assets are specified, developed, adjusted and approved individually, there are fewer bottlenecks for the level responsible artist to give feedback on the work. If a complete level of objects arrives, time becomes a constraint for reviewing each individual asset in detail.

'Space' is less important. The tasks can, in principle, be done anywhere in the world. However, IO Interactive stresses the importance of sight visits. Peter van Aller Rydmann regularly visits Mineloader and XPEC to communicate new guidelines or procedures in person to the teams and the management. In daily operations it is not important where art assets are created. Technologies allow for instantaneous transfer of an asset around the globe, however, the above examples illustrate that at certain points in the process some sort of meetings in person are necessary. Experience shows that space has importance for quality and that meeting in person facilitates mutual understanding between the partners.

#### 8.1.2.2 Inseparability Dichotomy Dynamics and Impact on Stickiness

The findings show that the crucial importance of timing was probably underestimated early in the outsourcing endeavor. In the beginning, the reason for starting to outsource was that the artists in Copenhagen did not have enough time to get the work done. It also became clear that they still needed to put time into correcting the assets when they returned from the Chinese partner. Short timelines were also the reason why IO Interactive switched to the KL2 model away from the original HM5 model.

The 'Video Gaming and Outsourcing' chapter highlights the increasing importance of timing. The pressure to make profitable games are huge as only 10-15% reach that goal. With enormous project teams the time from project kick off to 'street date' is important as delays can have serious economic impact on profitability. The 'timing' of keeping to project schedules and reaching critical milestones is equally critical. No project member should sit without work.

As there are many minor and major milestones in the production of a video game the importance of timing is amplified: The sourcing partner must deliver specifications on the day it is expected and the sourced partner must deliver the product on the day it is expected to allow for a few adjustments. In IO Interactive, the KL2 model required longer buffers for modification of assets. This particular lesson meant that the KL2 model was not feasible for the Hitman 5 production as it did not incorporate the longer buffer zones. The impact was stickiness in the form of prematurely approved levels in Kane and Lynch 2 and subsequent lower quality.

This means that the major change agent is contextual changes and pressure from competitors. Also, this has spawned experiential learning about incorporating buffer zones in the planning.

The development in the importance of space is comparatively insignificant. Some culture differences have been overcome by site visits but in the daily operations it has little importance where in the world the art is developed.

#### 8.1.2.3 Conclusion on H1-b

The results from testing sub hypothesis H1-b are inconclusive. The case findings cannot confirm that time and space become less important over time and that this reduces stickiness.

What emerges from the above discussion is that the importance of space will probably evaporate entirely as a factor causing stickiness. It appears that the importance of meeting the partner has decreased and this arguably has had a positive impact on stickiness (at least in the definition of stickiness as costs in information sharing). However, the data in the case study do not provide exact evidence to verify the hypothesis.

The findings show that time is highly important while the dynamics and impacts on stickiness are ambiguous. It became evident that high importance of 'timing' means high stickiness, and that it is crucial, though difficult, to get all assets completed in time and there are high risks of missing deadlines. However, the importance of timing does not become less as a result of experiential learning or management decisions. In fact, the case showed that timing appears to be increasing in importance because of the industry pressure as project timelines become shorter, new technologies surface more often and the industry is increasingly competitive. Therefore, stickiness from timing seems to increase over time because of changes in the context. However, there are elements of experiential learning that have had influence on the importance of timing. The plan to increase buffer zones in the KL2 model shows that decisions are made to make it less difficult to reach critical deadlines.

Contrary to expectations it looks as if the importance of timing should be understood differently and in a more ambiguous way: The importance of timing increases as a result of changes in the context and because of the partners' mutual resource planning optimization (only one week for submission and one week for QA). Consequently stickiness increases as it becomes ever more difficult to manage project schedules with many critical milestones. However, experiential learning leads to a better understanding between the peers as to how to reach the milestones, and both partners become better project managers.

Time matters and time makes it sticky to source globally. This stickiness is increasing and puts pressure on the project management discipline to manage deliverables. Perhaps this urgency increases the learning

aptitude and spawns mitigations to manage milestones better in order to limit the increase in stickiness. However, such speculations may be the subject of a different research.

# 8.1.3 H1-c Externalization and socialization knowledge conversion processes reduces stickiness over time in global knowledge transfers

#### 8.1.3.1 Tacitness and General Case Study Findings on the Dichotomy

The knowledge required to create art has all the properties of tacitness: It is difficult to teach to others, and the understanding of art is normally embedded in the unspoken knowledge among members of a group or within individuals.

For a video game it appears even more so: The knowledge to understand what graphic elements should look like to make the video game's world appear 'right' is supposedly entirely tacit knowledge. It is knowledge embedded in the context of all elements of the game: Game play, characters, sounds and other graphic elements and assets. Beyond the immediate context of the game, the wider cultural context should influence the desired outcome of the gaming experience. Danish producers, script writers and lead artists, who grew up with the same or very similar backgrounds arguably will have a strong mutual understanding of what makes a video game 'cool' and, therefore, what the individual elements in the game should look like. A Chinese artist has grown up with a different sense of what makes a video game 'cool'. A Chinese artist has a different idea as to what a good story should be and how it should be told, what the art should look like and how art is made. Chinese art students, for instance, are taught to copy the teachers until they master the same skills perfectly before venturing into their own creations. This is contrary to Western understanding of art and how it should be taught.

However, according to IO Interactive, Mineloader and XPEC are delivering what is expected from them. As mentioned, Mineloader has an almost complete understanding of what IO Interactive want and what their art should look like. Industry standards are emerging for art assets, which mean that less effort needs to be spent with the partner to make them understand what is required from them. The present generation of games for the consoles PS3, XBOX etc. appears to be reaching a consensus for what assets should look like and how they should be made. This also becomes evident by looking into the portfolio of both XPEC and Mineloader, which is displayed on their corporate websites<sup>3</sup>. Their contributions to recent games are remarkably similar whether it is weapons, vehicles or props (other assets not in a general category). Even characters within the games resemble each other.

The KL2 model required freestyling from the Chinese partner. The partner was required to not only deliver what was specified but also to make it appear realistic. It needed some time for the Chinese to understand the message (and for IO Interactive to deliver the message in a way that the Chinese could understand). The outcome was successful; there was the example mentioned above with the apartment that needed to look like an apartment of a Shanghainese girl and the Chinese partners added all requisites that gave authenticity to the game. However, that example was Shanghainese freestyling about Shanghai, something that they

<sup>&</sup>lt;sup>3</sup> http://www.xpec.com & www.mineloader.com

would tacitly know to a higher extent than the IO Interactive staff. It remains to be seen if they will achieve the same positive results if the scene in the video game is played out in a Bombay slum neighborhood or a Copenhagen café.

Hitman 5 is played out in an American city, and IO Interactive went to the locations and combined concept art with photos of the surroundings where the scene in the game was meant to play out. However, as the Hitman 5 resource planning worked as the earlier versions, each individual asset was handled separately, therefore the level responsible artist had a higher possibility of adjusting misunderstandings in time.

#### 8.1.3.2 Tacitness Dichotomy Dynamics and Impact on Stickiness

IO Interactive showed how they experienced stickiness because of the tacitness of knowledge required to make assets for video games. However, the case also shows how to effectively convert tacit knowledge into explicit knowledge and to teach directly to the Chinese partners, and how tacit knowledge in IO Interactive is transferred via socialization through interaction over time.

The socialization and tacit to tacit knowledge conversion process was evident with Mineloader. Initially, Mineloader did not understand what was required from them, which led to frustration in Copenhagen and a lot of interaction. However, as the parties spent more time interacting, a mutual understanding emerged. The 'metal brothers' mentioned above illustrates tacit to tacit knowledge conversion. Nevertheless, it is not only connection with the product that socialization is seen, it is also in the production process. Routines on how and when issues are solved emerged in the feedback loop as a result of interaction between the partners.

In addition, the wider industry context has facilitated the tacit to tacit transfer of knowledge from West to East. As mentioned, there is a consensus for PS3 and XBOX as to what art assets should look like, and as discussed in the chapter 'Outsourcing and Art in the Gaming Industry' the massive art sourcing from several studios creates an industry wide socialization and common understanding.

In terms of externalization, efforts were made to convert tacit knowledge into explicit knowledge when Peter Eide sat with the XPEC partners and showed them how IO Interactive creates a level and when the Art Director Rasmus Poulsen sat down at the meetings in Shanghai to draw for the Mineloader artists. It was felt that it would not make sense to write manuals and documentation on how to create a level. Instead, what would make sense was to show how the level is created. The Chinese partners filmed it, which meant that not only were the work steps in the computer system documented but their own questions and answers at the time of the making were accessible afterwards. This demonstration, arguably, made the stickiness of the tacit knowledge transfer easier. It was the urgency of getting XPEC productive as soon as possible and the experience with Mineloader, which made Peter Eide sit with XPEC. The co-operation with Mineloader was full of difficulties in the beginning, and primarily through socialization processes did Mineloader understand what was required.

The KL2 model requires 'freestyling', and it was initially difficult to explain to the Chinese partners in words what 'freestyling' means. They did not understand that they were required to work beyond the concrete

specifications to complete their task. Apparently 'freestyling' in the process of creating art is highly tacit and IO Interactive had learned that the Chinese partners were fully capable of freestyling; however, if the specifications were too direct, specific and concrete, the Chinese partner would follow the specifications strictly and would not freestyle. IO Interactive learned that they needed to send loosely specified plans to the Chinese partners, which enabled the Chinese to work creatively and to freestyle. In the world of Nonaka and Takeuchi (1995) 'freestyling' and loose specifications is clearly a way of conceptualizing and externalizing tacit knowledge and IO Interactive acted accordingly through extensive experiential learning.

#### 8.1.3.3 Conclusion on H1-c

IO Interactive's example highlights the knowledge conversion processes of tacit knowledge, and that these processes reduce stickiness over time. Socialization resulted in transferring tacit to tacit knowledge in both art products, the production process and the industry. Externalization efforts were consciously made to convert tacit knowledge to explicit knowledge by simply having the Chinese partners look over the shoulder of the lead artist. IO Interactive used their experiential learning from their experience with Mineloader, which took some time to get fully operational, as tacit to tacit knowledge conversion requires time. This experiential learning resulted in the externalization conversion process when Peter Eide sat with the XPEC team.

The case findings thus support the hypothesis. However, the case findings unexpectedly, show that video game art is less tacit than anticipated. The Chinese did not have fundamental difficulties in understanding what art should look like. It remains to be understood why art work for video games has a lesser degree of tacitness than what was originally thought. It may be that indeed art work is tacit, yet Chinese artists are used to copying other's work (as mentioned above) or it may be that the contextual tacit to tacit knowledge transfer is deeper than expected.

# 8.1.4 H1-d An activity sourced globally becomes more standardized over time and consequently stickiness is reduced

#### 8.1.4.1 Variability and General Case Study Findings on the Dichotomy

Each asset is unique. A vehicle, a weapon, or a lamp in the background is different from game to game in form, shape and size. The properties in terms of polygon counts are different according to the importance of the asset for the game play as well as the level of realism required for the asset.

Therefore, clear specifications for each individual asset are carefully crafted by the studio and forwarded to the outsourcing partner. The specification is not only a description but also concept art in 2D, which are drawings of different examples of what the 3D asset eventually will look like. It may also be photographs of the object in the surroundings required for the game. Typically, the artwork for a game is created entirely from scratch to ensure the uniqueness in the gaming experience and visual expression (Wyman, 2011).

For IO Interactive, this also appears to be true. New elements are created for each new game, and therefore entirely new concept art, specifications and documentation is forwarded to the XPEC and Mineloader.

However, standardization occurs and, as shown in the discussion about tacitness, industry standards are emerging. The visual appearance of assets is being standardized, even though they may have to be created new for technical reasons. This means, that there are less surprises in the outcome as perhaps XPEC has made a similar asset for another game. This means there is less and less requirement for reinventing what the wheel should look like whether it belongs to a Mercedes SLR in a driving game, or is fastened to an ox carrier from the middle ages in a fantasy role playing game; both the development studio and the outsourcing partner know shape, colors, details and sizes.

There are examples of IPs where the studio is recycling buildings from previous versions of the game (Gaming Blend, 08.11.2011) and it would be tempting to conclude that development studies and art studios alike are recycling assets that have been successfully used in similar games. In fact, since the production of 3D assets for video games is really only in the development process (it is possible to copy paste) it would not make sense to start from the beginning each time. Especially in the case where work has already been done with an external partner and the external partner expects similar results in comparison with previous ventures.

During HM5 production all assets are created new. The engine 'Glacier II' opens possibilities to make more details in photo realistic quality easier. This means that all graphics, from whisky bottles to office buildings, are constructed from scratch and, in addition, a long production plan because millions of objects needed to be completed for the game.

#### 8.1.4.2 Variability Dichotomy Dynamics and Impact on Stickiness

The case findings show that stickiness is reduced over time because both the products and procedures in the development of graphic assets for video games are becoming increasingly standardized.

The general industry trends showed a mutual agreement on art assets. The software tools to create assets, the procedures to transfer assets back and forth among peers and the language used to describe open issues and general naming conventions are becoming standards industry wide.

IO Interactive's experience with Mineloader and XPEC illustrates the process: In the beginning, with Kane and Lynch 2, it was important to have Martin Guldbæk on site in Shanghai to work directly with Mineloader. It was difficult to get the expected result and an effort was needed to specify exactly what the assets should look like. Martin Guldbæk had specific knowledge of what was required from the art as he was art director on the original production of Kane and Lynch. Therefore, he could specify and guide the Chinese partner towards exactly what was required. Now, Mineloader delivers standard products as they are familiar with the industry standards and IO Interactive's specific needs for each individual game. The experience with XPEC was similar. Peter Eide sat on their premises in Suzhou and taught them how to make a level for the game. After a few attempts XPEC could also deliver more or less standardized products for both Kane & Lynch and Hitman. It is tempting to assume some degree of recycling of assets, although this has not been established in the case study.

The production procedures have also become standardized because of experiential learning and industry trends. An attempt was originally made to have versions for measuring the level of completion of an asset, however, that was discarded in favor of the routines that emerged naturally between IO and XPEC / Mineloader. IO Interactive and their partners found out what worked and what did not work and changed procedures accordingly.

In the beginning, there was a high degree of stickiness in specifying each and every asset individually in the beginning, however, as the firms learned to work together both products and procedures developed towards standardization. This experiential learning process and industry standards has had high impact on reducing stickiness. It becomes less difficult to work together over time as standards emerge.

#### 8.1.4.3 Conclusion on H1-d

The case findings confirm sub hypothesis H1-d and show that in the case of art sourcing, the activity did indeed become more standardized over time and this reduced stickiness.

As a result of industry trends and experiential learning the activity to create art assets moved from being highly customized towards a more standardized product and process. This has made work easier with the partners and reduced the number of unexpected issues and therefore made the process less sticky. The variation attribute fits well with the assumptions that stem from Johanson and Vahlne (2009) about experiential learning: Firms learn to trust each other over time and commit more resources.

The case findings about the variation attribute highlight that the dynamics in the dichotomy reduce customization efforts over time as predicted in the hypothesis and that this process makes work less difficult and, as such, less sticky.

# 8.1.5 H1 - For an activity sourced globally the activity attributes' dynamics reduce stickiness over time

This research's findings and analysis confirm the main hypothesis as three out of four sub hypotheses were fully confirmed. The table below shows the conclusions from the analysis

Sub	Activity	Findings on the dichotomy	Dynamics and Impact on Stickiness	Confirmed / Not
Hypothesis	Attribute			Confirmed
H1-a	Inter-	Different designs for suppliers and	Experiential learning between partners	Confirmed
	dependency	games. Higher interdependency	leads interdependency from a reciprocal	
		leads to higher stickiness.	setup towards a sequential setup, which	
			leads to less stickiness. Management	
			decisions in KL2 to reduce	
			interdependency from reciprocal to	
			sequential reduced stickiness	
H1-b	Inseparability	The importance of timing is high,	The importance of timing appears to	Inconclusive
		while the importance of space is	increase and consequently stickiness	
		low. Stickiness is high because of	increases. Project management is under	
		the importance of timing.	pressure to introduce measures to control	
			the importance of timing in order to slow	
			down the stickiness increase	
H1-c	Tacitness	Art work is less tacit knowledge	Socialization transfers tacit knowledge to	Confirmed
		than anticipated. However,	the partner automatically. However, this	
		originally both the process and the	process takes time and stickiness is only	
		product was not fully understood	reduced gradually. Conscious	
		by the partner's Mineloader	externalization conversions of tacit to	
			explicit knowledge drastically reduce	
			stickiness and knowledge is transferred	
			faster.	
H1-d	Variability	Art assets for video games are	Industry trends, experiential learning,	Confirmed
		becoming standard products. They	formalization and routinization of processes	
		are heterogeneous; and processes	lead to a more standardized product	
		and products are reaching industry	produced in increasingly similar practices.	
		standards.	This has decreased the efforts required to	
			communicate specifications and	
			consequently reduced stickiness.	

Table 2, Hypotheses Verification

The analysis shows the main hypothesis to be true, although H1-b is inconclusive. H1-b showed trends in either direction of reducing / increasing stickiness over time. This study does not weigh the impact of each attribute in relation to the others; however, it was noted that the inseparability attribute's dichotomy dynamics have a long term impact. Therefore, in relation to the other attributes, it would be fair to argue that the impact is relatively less because the changes take longer and are not reflected in one production cycle.

## 9 Discussion

This research found that in IO Interactive the process of outsourcing art for video games was sticky but it became less sticky over time. This decrease in stickiness was the result of changes in the art outsourcing activity's attributes. The attributes that cause stickiness are the variability, the tacitness, the interdependency and the inseparability of the outsourced activity. The changes happened because of specific management decisions, changes in the industry context and experiential learning.

### 9.1 Representativeness of the Case Study

Within the video game manufacturing industry IO Interactive looks like other video game producing studios. IO Interactive is owned by a large multinational publishing house, which owns several studios and various video game IPs. This is similar to the trend within the industry in general. In this case, consolidation among a few major publishing houses increasingly resembles the film manufacturing industry.

IO Interactive makes video games for the gaming consoles PS3, Wii and XBOX, which are the most popular platforms for the sale of video games. IO Interactive develop their own engine (the tool that facilitates the creation of several different video games), which is costly but which is preferred by many studios. IO's development team includes the same job titles and responsibilities as other firms and the project plan is almost identical to that of their competitors and peers.

In terms of outsourcing, IO Interactive were pioneers among the Eidos and Square Enix studios. They joined a trend, which was just kicking off and they effectively did what other studios were beginning to do about the same time. Today, they outsource activities to a level similar to that of their competitors and from the location where most studios are looking for talent: Shanghai.

This means that the case study results are likely to be applicable to the entire industry as IO Interactive appears to be a good representative of the entire population. Therefore, the case study is expected to give similar results if replicated for another video game studio that outsource art for video games. This would mean that a different studio will experience similar stickiness in the early days of their outsourcing venture but later on the stickiness will have decreased. The activity's attributes will change as they adjust management decisions and learn to work together with the partner studio.

The case study's applicability to other industries cannot be verified in this research. The video gaming industry is specific and different in many ways. The craft of creating art for video games is unlike any other discipline. However, this case study is not excluding that the model does not work for other industries. IO Interactive is a project driven organization. Lately successful firms in all industries use project management extensively to develop new products and processes. Nonaka (1991) notices that "successful companies are those that consistently create new knowledge... [and whose] sole business is continuous innovation." (Nonaka, 1991, p. 96), while Van Der Merwe says that "...[m]ajor companies now use project management as their principal management style." (Van Der Merwe, 2001, p. 15). The business model of IO Interactive is therefore interesting as firms become more driven by innovations and projects. As to art creation for video

games, it was shown in this research's findings that the process, unexpectedly, is rather technical and less creative. Most similarities to the process of creating art for video games are found in general software development. Therefore, it is possible that there will be similarities in the case study results of IO Interactive to other types of software development projects.

Although plausible this is speculations, as mentioned above. The external validity described in the methodology chapter should be kept in mind (whether or not the results can truly be generalized to the entire population) and this study will only claim that the results apply to the video game industry because it appears that IO Interactive is a good representative for the general video game industry.

## 9.2 Theoretical Implications

The case findings verified the hypothesis *that for an activity sourced globally the activity attributes' dynamics reduce stickiness over time*. They also substantiated that the longitudinal model for stickiness in global sourcing can help visualize the process. To understand the results it may be advisable to take a step back from the raison d'être of the case study. If IO Interactive's staff or other business people outsourcing to Shanghai are asked "what was most difficult when you started to outsource to Shanghai?", the intuitive answer is normally "...it was most difficult to overcome the cultural differences between China and Denmark". National cultures' impact on sourcing is studied by Stringfellow (2007), Harzing & Feely (2008), Bartlett et al. (2008). This case study, in contrast, takes an activity-based operational perspective on global sourcing. Therefore, it is a small building block in that direction for the academic debate on global sourcing. It highlights the complexities that emerge by taking an activity based operational approach. This became apparent when it was necessary to synthesize at least three existing theories to establish hypotheses for the research to get a better understanding of stickiness in global sourcing.

Further research could perhaps focus on building bridges from the operation level to the cross cultural management level by including more contextual independent variables in the study, such as national or corporate culture.

It may also be worthwhile to further pursue the ambiguous results about the inseparability attribute that the analysis showed. Contrary to expectations it appeared (but was not verified) that the importance of timing is increasing. The change agents are contextual (such as competitive pressure and industry standards), and the corresponding stickiness is high: Firms can perhaps afford to have activities dispersed globally but cannot afford to be patient. In line with the abductive methodology that brought about this research, the next step would be to develop new hypotheses for the unsubstantiated connection between stickiness and time.

## 9.3 Managerial Implications

"At the strategic level, firms evaluate the reasons for and risks ...the investment, resources, governance, cultural, infrastructure.. and in broad terms decide what parts of the work cycle to move offshore..." (Kumar et al., 2008, p. 2). Kumar et al.'s (2008) argument is equally important for understanding the results' implication for management. The activity based operational level view offers a different approach to

analyzing business cases for global sourcing practitioners. This research comes closer to understanding the daily work in the firm. A key assumption of this study is indeed that the lack of understanding the operational level is a reason why expected cost reductions are overestimated and materialize more slowly than expected. In the speculative case where the longitudinal model for stickiness in global sourcing would apply beyond the video game industry, the results could therefore have significant implications for firms' operational and strategic level.

For the operational level the results would mean that efforts need to be put into changing the dichotomies of the globally sourced activity's attributes. Efforts would have to be spent on modularizing the activity into standard operations to reduce the variability; energy should be invested in conceptualizing tacit knowledge and socializing the individuals to transfer tacit knowledge; management should break down operations into separate tasks that are organized with sequential or pooled interdependency as far as possible; finally the importance of time and space should be thoroughly understood to ensure that the additional stickiness should not come as a surprise (since the firm can do little to change the importance of the time and space dichotomy).

For firms' global sourcing strategy the implications are a less 'emotional' approach to understanding what to outsource. The influential core competence or the core activity view as proposed by Quinn and Hilmer (1994) suggests that firms should outsource everything else than what they themselves are best at (in the world). As Kotabe et. al. (2007), Moll (2007) and others have highlighted, it is very difficult to practically define a core competence and it is unlikely to be found in one activity. Therefore, it appears to be a highly subjective matter for the firm to choose its core competences. The standard answer to what the firms' core competences are seems to starts with "we feel..." This research would suggest a different approach to assist firms in assessing what to source globally, namely that there is inherent stickiness in every activity (regardless of how the firm defines an activity), and therefore, there is a higher likelihood of realizing expected benefits by sourcing those activities that have less stickiness. Activities that have more inherent stickiness in the attributes require more effort to be sourced. In fact, it could be possible to make a scale for different standard activities' stickiness that firms generally source. This means that there could be stickiness levels for various activities in the finance department: Sourcing of 'accounts payable' would have one level, while 'cash and bank' would have another level. In the logistic department 'transportation', 'picking and packing' or perhaps 'warehousing' would each have a stickiness level that could guide management in making better qualified decisions on how difficult it will be to source.

# **10 Conclusion**

This research is a case study of stickiness in global sourcing on an activity-based operational level. The aim was to investigate what makes global sourcing sticky and how stickiness in global sourcing evolves over time. That has led to the research question:

'What factors influence stickiness in global sourcing and how does stickiness develop over time?'

To answer the research question, the case of IO Interactive's art for video games outsourcing was studied. The case study methodology allowed for understanding the complex details of the activity sourced, the sourcing process and the context on an operational level in global sourcing.

The specific case and the research question was chosen due to an abductive reasoning where initial hypotheses where discarded after the first exposure to the case study and the case organization. This led to a revisit to the global sourcing body of literature and eventually to a new model and the final research question together with the underlying hypotheses.

The main hypothesis (H1) was that for an activity sourced globally the activity attributes' dynamics reduce stickiness over time. To test the main hypothesis it was broken down into four sub hypotheses: H1-a An activity sourced globally becomes less interdependent over time and consequently stickiness is reduced; H1-b For an activity sourced globally, time and space become less important over time and consequently stickiness is reduced; H1-c Externalization and Socialization knowledge conversion processes reduce stickiness over time for global knowledge transfers; H1-d An activity sourced globally becomes more standardized over time and consequently stickiness is reduced. The four sub hypotheses were then tested empirically on the results of the case findings. H1-a, H1-c, and H1-d were confirmed by the analysis; however, H1-b was neither unconfirmed nor confirmed. Still, this led to the conclusion that H1 was confirmed by the research.

The research shows that the factors influencing stickiness for an activity sourced globally are the activity's attributes. Variability, tacitness, inseparability and interdependency are attributes of an activity. The dichotomies of these attributes cause the level of stickiness for sourcing an activity globally. It appears that over time the dichotomies change in direction of reducing stickiness mostly as a result of experiential learning, contextual changes and management decisions.

# **11 References**

### 11.1 References: Literature

Bartlett, Christopher; Ghoshal, Sumantra & Beamish, P. W. (2008). *Transnational Management: Text, Cases & Readings in Cross-Border Management*. 5th ed. New York: McGraw-Hill/Irwin, pp. 559-573

Barney, Jay (1991). *Firm Resources and Sustained Competitive Advantage*. Journal of Management, vol. 17, no. 1, pp. 99-120.

Cyert, Richard M. & March, James G. (1963). *A behavioral theory of the firm*. Prentice-Hall inc., New Jersey, USA.

Dunning, John (2000). *The eclectic paradigm as an envelope for economic and business theories of the MNC activity*. International Business Review 9, 2000, pp. 163-190

Fabricatory, Carlo (2004). *Gameplay and Game Mechanics Design: A key to Quality in Videogames*. Initium Studios.

Fields, Tim (2010). *Distributed Game Development - Harnessing Global Talent to Create Winning Games*. Elsevier Inc.

Fiol, Marlene C. & Lyles Marjorie A. (1983). *Organizational Learning*. Academy of Management Review, vol. 10, no. 4, pp. 803-813.

Flyvbjerg, Bent (2004). *Five misunderstandings about case-study research*. From Clive Seale, Giampietro Gobo, Jaber F. Gubrium, and David Silverman, eds., Qualitative Research Practice. London and Thousand Oaks, CA: Sage, 2004, pp. 420-434.

Fuglsang, Lars. & Olsen, Paul Bitch (2003) Videnskabsteori i samfundsvidenskaberne: på tværs af fagkulturer og paradigmer. Roskilde Universitetsforlag, Frederiksberg.

Harzing Anne-Wil, & Feely, Allan J. (2008). *The language barrier and its implications for HQ-subsidiary relationships*. In Cross-cultural Management: An International Journal, vol. 15, no 1, pp. 49-61.

Hennart, Jean-Francois (1991). *The transaction cost theory of the multinational enterprise*. In Pitelis & Sudgen, The nature of the Transnational Firm, Routledge.

Jensen, Peter D. Ørberg & Pedersen, Torben (2011). *The Economic Geography of Offshoring: The Fit between Activities and Local Context.* Journal of Management Studies 2011, vol. 48, no. 2 pp. 352-372.

Jensen, Peter D. Ørberg (2011). A passage to India: A dual case study of activities, processes and resources in offshore outsourcing of advanced services. Journal of World Business (2011), doi:10.1016/ j.jwb.2011.04.018.

Johanson, J. & Vahlne, J. (2009). *The Uppsala internationalization process model revisited: From liability of foreignness to liability of outsidership.* Journal of International Business Studies 2009, vol. 40, pp. 1411-1431.

Kogut, Bruce and Udo Zander (1992). *Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology*. Organization Science, vol. 3, no. 3, pp. 383-97.

Kotabe, Masaaki; Mol, Michael & Ketkar, Sonia (2008). *An Evolutionary Stage Model of Outsourcing and Competence Destruction: A Triad Comparison of the Consumer Electronics Industry*. Management International Review2008, vol. 48, no. 1, pp. 65-93.

Kotabe, Masaaki; Murray, Janet Y.; West, John & Stanford A. (2009). *Global Sourcing Strategy and Performance of Knowledge-Intensive Business Services: A Two-Stage Strategic Fit Model*, Journal of International Marketing, American Marketing Association 2009, vol. 17, no. 4, pp. 90-105.

Kumar, Kuldeep; Fenema, Paul Van; Glinow, Mary Ann von (2008). Offshoring and the global distribution of work: Implications for task interdependence theory and practice. Journal of International Business Studies, pp. 1-26.

Kvale, Steinar (1997). *Interview: En introduktion til det kvalitative forskningsinterview*. Hans Reitzel, Copenhagen.

Mol, Michael (2007). Outsourcing. Cambridge University Press.

Nonaka, Ikujiro & Takeuchi, Hirotaka (1995). The Knowledge Creating Company. Oxford University Press.

Nonaka, Ikujiro (1991) *The Knowledge creating company*. Harvard Business Review, vol. 6, no. 8, pp. 96-104.

Pedersen, Kaare. (2005). *Social science in project work and the project report.* From Problem-oriented project work - a workbook. Paul Bitsch Olsen & Kaare Pedersen, eds., Roskilde University Press, Roskilde, pp. 123-148.

Prahalad, Coimbatore K. & Hamel, Gary (1990). *The core competence of the corporation*. Harvard Business Review, vol. 68, no. 3, pp. 79-91.

Quinn, James Brian & Hilmer, Frederik G. (1994). *Strategic Outsourcing*. Sloan Management Review 1994, vol. 35, pp. 43-55.

Screen Digest (2010). Outsourcing in Next Generation Games Development: Delivering cost and production efficiency. <u>www.screendigest.com</u>.

Simon, H. A. (1983). Reason in Human Affairs- Stanford, University Press.

Smed, Jouni & Hakonen, Harri (2003). *Towards a Definition of a Computer Game*. Turku Centre for Computer Science.

Stringfellow, Anne, Teagarden, Mary and Nie, W. (2008). *Invisible Costs in Offshoring Services Work*. Journal of Operations Management.

Szulanski, Gabriel (2000). *The Process of Knowledge Transfer: A Diachronic Analysis of Stickiness*. Organizational Behavior and Human Decision Processes, vol. 82, no. 1, pp. 9-27.

Teece, David J. (2000). *Firm capabilities, and economic development: Implications for NIEs*. From Kim and Nelson, Technology, learning and Innovation, Mass: Cambridge University Press.

Thompson, J. D. (1967). Organizations in action. New York: McGraw-Hill.

Tholons (2009). *Game Development Outsourcing*. Tholons Advisory, Investment & Research, <u>www.tholons.com</u>.

Trochim, William (2006). The Research Methods Knowledge Base, 3e. Atomicdogpublishing.com.

Van de Ven, Andrew H. (2007). Engaged Scholarship - A Guide for Organizational and Social Research. Oxford University Press.

Van de Ven, Andrew. H.; Delbecq, A. L., & Koenig Jr., R. (1976). *Determinants of coordination modes within organizations*. American Sociological Review, vol. 41, no. 2, pp. 322-338.

Yin, Robert K. (2009). *Case Study Research: Design and methods*. Sage Publications, Los Angeles, Califonia.

Van Der Merwe, A. P. (1997). *Multi-project management--organizational structure and control*. International Journal of Project Management, vol. 15, no. 4, pp. 223-233.

Von Hippel, E. (1994). "Sticky information" and the locus of problem solving: Implications for innovation. Management Science, vol. 40, no. 4, pp. 429-439

Wyman, Michael Thornton (2011) Making great games: an insider's guide to designing, Elsevier Inc.

#### 11.2 References: Newspaper and Internet sources

Børsen (2008.07.01). /ritzau/. *Lego opsiger samarbejde med Flextronics* <u>http://stage2.borsen.dk/nyheder/investor/artikel/1/135160/lego\_opsiger\_samarbejde\_med\_flextronics.html</u>, accessed 2012.01.30.

Gaming Blend (2011.11.08) *Modern Warfare 3 Video Contains Recycled Buildings From Modern Warfare*. <u>http://www.cinemablend.com/games/Modern-Warfare-3-Video-Contains-Recycled-Buildings-From-Modern-Warfare-1-36816.html</u>, accessed 30.11.2011.

Jyllands-Posten (2000.08.23). Jacobsen, Erling Vester. *Kina: Verdens største ølmarked.* Erhverv og Økonomi, p. 6.

LA Times (2011.02.15). Hiltzik, Michael. 787 *Dreamliner teaches Boeing costly lesson on outsourcing*. http://articles.latimes.com/2011/feb/15/business/la-fi-hiltzik-20110215, accessed 2012.01.30.

Mandag Morgen (2009.10.26) Reiermann Jens. *Danske virksomheder sjusker med outsourcing til Kina*. <u>https://www.mm.dk/danske-virksomheder-sjusker-med-outsourcing-til-kina</u>, accessed 2012.01.30

Reuters (2011.06.06). Baker, Liana B. *Factbox: A look at the \$65 billion video games industry*. <u>http://uk.reuters.com/article/2011/06/06/us-videogames-factbox-idUKTRE75552I20110606</u>, accessed 2012.01.30.

Outsourcereport.com (2007.02.01). Tailoring Your Outsourcing Strategy. Executive insight into the strategic initiative of outsourcing.

http://outsourcereport.com/index.php?page=magviewer&mag=1&pp=1, accessed 2011.10.16

The New York Times (2005.04.03). Friedman. Thomas L. *It's a Flat World, After All*. Section 6, Column 1, Magazine Desk, p. 33.

# **12 Appendices**

- Appendix 1: Executive Summary
- Appendix 2: Initial research proposal to IO Interactive and response
- Appendix 3: List of Interviews
- Appendix 4: Summaries of Interviews

## Appendix 2: Initial research proposal to IO Interactive and response

Date: Mon, 16 May 2011 21:23:54 +0700

Subject: Master's Thesis Collaboration with Copenhagen Business School student

From: Mikkel Vester Jacobsen <mvjmvj@gmail.com>

To: jobs@ioi.dk

Dear IO Interactive,

I am Master's student at Copenhagen Business School and am at the moment writing my thesis. I found that IO Interactive sometimes does collaboration with Master's students on their thesis and would like to explore these possibilities further.

My thesis' focus is on outsourcing and I am particularly interested in companies that are increasingly outsourcing activities to external suppliers.

I would like to investigate the strategic choices that IO Interactive are considering in moving parts of their activities to external partners to understand the motives and to speculate about the consequences.

My, rather basic, understanding of the industry for computer games is that the manufacturing of graphic elements in computer games are increasingly bought externally, as opposed to developed internally, to save costs and free capital resources to focus on game design, engine development and project management of the game development.

My interest stems from the case of consumer electronics where companies like Philips and Sony found themselves in a "vicious circle" of outsourcing. In order to save cost and sell products at increasingly competitive prices they outsourced manufacturing of certain products to cheaper locations, however, realized that their outsourcing vendor became their competitor and that they had unlearned valuable technologies in production. The result was that Philips is now not making consumer electronics anymore and Sony has insourced activities that were previously done outside the company.

My general concern is that companies are hollowing out, or unlearning, critical skills in the long run in their pursuit for short-term cost savings.

Although, I honestly have little knowledge about the game industry, I feel it is very interesting in this context because, I assume, that work is project based and generic manufacturing of graphic objects is fairly easy because of effective interfaces. However, I am excited to learn more about this.

I have a background in SAP consulting and project management of SAP projects. I appreciate that it is highly different from the nature of your business, however, I think it does make it easier for me to understand the processes involved from initial planning of a game until it is launched.

One approach, that I have considered if you would like to collaborate with me, is to look into your highly successful Hitman game (which I have personally been a big fan off since it was launched originally and I am honestly quite looking forward to play Absolution). 1) Look into how the game development activities from plan to launch has changed from Hitman 1 to Hitman 5 to understand the project activities involved in developing games; 2) Examine the progress of how you have involved different external suppliers in the project activities and how this have changed from project to project; 3) investigate the motives from moving activities previously done inside IO Interactive to outside suppliers; 4) discuss the consequences in relation to competitors' behavior and the industry's outlook.

How you may help: I would like to first spar with a contact within the company that can guide me to understand how the development of a game works. I expect that this would take 3 times 2 hours in the course of a month. If such a person would have time/interest, I would like to maybe work together with this person over the course of 2-3 months (however, as mentioned, maximum 2-3 times a month). Then I would like to make interviews with people involved in the design the game manufacturing process to get an understanding of this. I think this will not take more than maximum 2 hours of somebody's work Week.

The whole process will be finished in September 2011.

I hope this will be of interest to you. My results will be of an academic nature, however, I think that the approach of my project will be interesting to IO Interactive as it may provide new insight to your game manufacturing process. Depending on my results, it may be either that I will either warn you of future issues that may come up or that I can give small recommendations as to how to prosper even further from outsourcing activities.

I am attaching my CV and academic results for your reference and I am looking forward to hear from you.

I am available at all times and you can call me directly on +45 52 80 50 29

Best regards,

Mikkel

Date: Fri, 10 Jun 2011 17:24:42 +0200

Subject: FW: Master's Thesis Collaboration with Copenhagen Business School student

From: "Peter van Aller Rydmann" <peterar@ioi.dk>

To: <mvjmvj@gmail.com>

Dear Mikkel,
Thanks for your interest in IO Interactive and apologies for not getting back to your earlier. In addition to all the activities surrounding the announcement of Hitman Absolution I have been away on business trips and will sadly have to leave again next week.

My role in the company is to handle current and future outsourcing activities for our projects and other departments, such as Marketing and Creative Services (creates assets not going into our games, but used for promotion etc.)

I am actually interested in learning more about how we could fit into your master thesis, but apart from the fact that you might already have found another case company, I have one concern: Time.

As far as I understand, you have a deadline in September? The earliest time I would be able to discuss further with you would be towards the end of June and on top of that IO has a three week summer holiday where we more or less close the company in weeks 29, 30 and 31. That leaves quite short time for your interviews and processing the data, but it is probably something which you need to determine yourself or we can discuss the plans via email during next week when I am abroad.

If you are still interested, despite these time constraints, I am up for discussing plans and content further and identifying the people within our organization that would be beneficial for your research.=20

Thanks,

Peter van Aller Rydmann

Outsourcing Manager | Io Interactive

## Appendix 3

Interview date	Interviewee	Theme of Interview	Reference in Appendix
2011.06.28	Peter van Aller Rydmann, Outsourcing	Video game industry	Appendix 4.1
	Manager, IO Interactivex	in general, the	
		process the project,	
		the elements.	
		Outsourcing in IO	
		Interactive	
2011.08.16	Peter Eide Paulsen, Line Producer, IO	The outsourcing	Appendix 4.2
	Interactive	history of IO	
		Interactive	
	Peter van Aller Rydmann, Outsourcing		
	Manager, IO Interactive		
0011.00.00	Deter File Declare Line Declarer 10	Detaile	
2011.09.29	Peter Elde Paulsen, Line Producer, IO	Details on	Appendix 4.3
	Interactive	outsourcing	
		operations	
	Peter van Aller Rydmann, Outsourcing		
	Manager, IO Interactive		

## **Appendix 4 Interviews**

The summaries can be found with the original comments that were added by the interviewees on the CD Enclosed. Please note that the interviews are strictly confidential.

Appendix 4.1: Interview 2011.06.28 with Peter van Aller Rydmann

File name: Jacobsen\_Mikkel\_Master Thesis\_ Appendix 4.1\_Interview 2011.06.28.pdf

Appendix 4.2: Interview 2011.08.16 with Peter van Aller Rydmann and Peter Eide

File name: Jacobsen\_Mikkel\_Master Thesis\_ Appendix 4.2\_Interview 2011.08.16.pdf

Appendix 4.3: Interview 2011.09.29 with Peter van Aller Rydmann and Peter Eide

File name: Jacobsen\_Mikkel\_Master Thesis\_ Appendix 4.3\_Interview 2011.09.29.pdf