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MANAGEMENT CONTROL OF SUPPLIER RELATIONSHIPS IN MANUFACTURING:

A CASE STUDY IN THE AUTOMOTIVE INDUSTRY

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ABSTRACT

This paper studies management control system design of supplier relationships in manufacturing, a supply chain phase currently under-explored. Compared to supplier relations during procurement and R&D, which research found to be governed by a combination of formal and informal controls, supplier relations in manufacturing are more formal, so that they could be governed by more formal and less informal controls. In order to refine management control theory, we propose a theoretical framework specifically adapted for the manufacturing phase. This framework is investigated by means of an in-depth case study of the supplier management control system of a Volvo Cars production facility. We identify three types of suppliers that visualize the associations in the framework and illustrate the framework's explicative power in automotive manufacturing. Furthermore, the case contradicts that supplier relations in the manufacturing phase are governed by little informal control, because the automaker highly values the role of trust building and social pressure. Most notably, a structured supplier team functions as a clan and establishes informal control among participating suppliers, which strengthens the automaker's control on dyadic supplier relations.

Keywords: Management control; Supplier relationships; Manufacturing; Contingency theory; Case research; Automotive

INTRODUCTION

In the current economic environment, characterised by globalisation and enhanced levels of competition, companies require an effective supply chain with inter-organizational relationships (IORs) to strive for sustainable competitive advantage. Not surprisingly, studies show that IORs have a high potential impact on the organization's performance (e.g. Anderson & Dekker, 2005). Literature, however, also argues that many IORs do not provide the expected benefits and are often terminated because of managing difficulties (Ireland, Hitt & Vaidynanath, 2002). Academics often propose that lack of coordination and opportunistic behaviour of partners are the two main reasons for the relatively high relationship failure rate (e.g. Dekker, 2004). Hence, management control systems (MCSs) might play a critical role in preventing such failure, by establishing governance mechanisms to control the relationship (Ireland et al., 2002).

The fundamental goal of MCSs is to influence decision making in attaining strategic objectives (Nixon & Burns, 2005). In an inter-organizational setting, this implies creating bilateral incentives to pursue mutual goals. Already in the mid-nineties, scholars started calling for more attention for this topic (e.g. Hopwood, 1996; Otley, 1994), and have not stopped since (e.g. van der Meer-Kooistra & Vosselman, 2006). Consequently, inter-organizational MCSs have been studied from several angles, including outsourcing (e.g. Anderson, Glenn & Sedatole, 2000), inter-organizational cost management (e.g. Cooper & Slagmulder, 2004), partnerships (e.g. Seal, Berry, Cullen, Dunlop & Ahmed, 1999), strategic alliances (e.g. Dekker 2004), networks (e.g. Kajüter & Kulmala, 2005) and joint ventures (e.g. Kamminga & van der Meer-Kooistra, 2007). Yet, the main emphasis was put on relational collaboration during the first phases of the supply chain, namely procurement, which involves the make-or-buy decision, partner selection and contract design, and R&D. Although this historical focus is certainly justified, management control in a later phase of the supply chain, namely manufacturing, remains relatively under-explored (Cooper & Slagmulder, 2004; Langfield-Smith & Smith, 2003; Scannell, Vickery & Dröge, 2000). However, purchased products and services for manufacturing account for more than 60% of the average company's total costs (Degraeve & Roodhooft, 2001) and are subject to continuous improvement with suppliers, also requiring adequate management control.

Therefore, this study illustrates how manufacturers design the MCS of supplier relations in the manufacturing phase of the supply chain, which we refer to as "manufacturer-supplier relationships" (MSRs). In other words, we abstract from procurement and R&D influences.[1]

Nevertheless, management control research on previous supply chain phases, offers a first theoretical insight into how a MCS for MSRs could look like. In particular, prior empirical research on IORs such as R&D collaboration (Cooper & Slagmulder, 2004), strategic alliances (Dekker 2004) and joint ventures (Kamminga & van der Meer-Kooistra, 2007) found MCSs that combine both formal controls, like outcome controls, and more informal controls, such as trust building. Also the execution of outsourced services, like industrial maintenance (van der Meer-Kooistra & Vosselman, 2000), IT (Langfield-Smith & Smith, 2003) and accounting (Nicholson, Jones & Espenlaub, 2006) is governed by a combined MCS. So, if we assume these findings to hold for other IOR types and neglect potential characteristic differences, MSRs could be expected to be governed by a combination of formal and informal control as well.

Yet, by taking into account differences between MSRs and other types of IORs, the MCS design could be different. In that respect, the literature argues that manufacturing is more formal than procurement and R&D. Indications for that argument and its consequences for management control can be found in the management control framework of Das & Teng (2001). Based on the variables in their framework[2], task programmability and outcome measurability, it should be clear that for manufacturing both variable levels are high; or at least *higher* than in the case of procurement and R&D. Consequently, the framework indicates that formal controls are suited mechanisms to govern MSRs. This argument is strengthened by the type of knowledge usage in MSRs, for which there exists a clear distinction between knowledge exploration and knowledge exploitation.

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[1] In terms of research methodology, this abstraction is put into operation by studying MSRs between a manufacturer facility and supplier facility only dealing with manufacturing, while procurement and R&D are handled by their respective mother companies (cf part three of this paper "research methodology").

[2] Although this framework was originally developed by Ouchi (1979) for use in MCS design within organizations, Das & Teng (2001) further adapted it for use in IORs. Task programmability refers to the degree to which managers understand the transformation process in which appropriate behaviour is to take place. Outcome measurability refers to the ability to measure outcome precisely and objectively. When outcome measurability is high/low and task programmability is low/high, formal outcome/behaviour control should be set up to govern the relation. When both dimensions are low, informal control is preferable, but when both measures are high, both outcome and behaviour control are suited control mechanisms (Das & Teng, 2001).

On the one hand, it is argued that the first supply chain phases, like procurement and R&D, aim at knowledge exploration, while the later phases, such as manufacturing, primarily aim at knowledge exploitation.

On the other hand, research shows that the exploration of knowledge is best governed by informal controls, while knowledge exploitation is most adequately controlled by formal controls (Bijlsma-Frankema & Costa, 2005). Thus, based on the characteristics of high task programmability, high outcome measurability and knowledge exploitation goals, MSRs could be expected to be governed by primarily formal controls with little informal controls. In other words, the literature offers different management control designs for MSRs regarding the informal control level. Therefore, this study investigates how the MCS of MSRs is designed and how important informal controls are in that design, in particular in IORs between an original equipment manufacturer (OEM) and suppliers of outsourced manufacturing activities in the trend-setting automotive industry (cf Womack, Jones & Roos, 1990).

An automobile is a complex product manufactured with thousands of components. Consequently, also this industry increasingly outsourced non-core activities and started relying on suppliers to create lower costs. To that end, a variety of supply chain management practices has been implemented, such as lean supply and continuous improvement. Yet, these practices induce the need for appropriate management control structures and bi-directional communication to organize and manage the relation (Carr & Ng, 1995; Cooper & Slagmulder, 1999; Scannell et al., 2000). In that respect, one particular automaker, namely Toyota, is known for partnering with suppliers, transferring its expertise to help suppliers and installing softer forms of control including trust. To govern the search for continuous improvement in manufacturing, Toyota established the “Toyota Group” by means of a supplier association, an operations management consulting division and voluntary small group learning teams (Dyer & Nobeoka, 2000). Other automakers, however, govern this search by heavily formalized supplier relations. Contrary to cooperation during procurement and R&D, manufacturing is argued to become much more demanding towards suppliers. Automakers increasingly transfer manufacturing risk and supply responsibility to first-tier suppliers, which results in suppliers delivering to very tight just-in-time and in-sequence schedules (Alford, Sackett & Nelder, 2000). As a result, OEMs install formal controls and supplier improvement techniques, which alert suppliers to the importance of ameliorating supply performance at lower costs. Hence, also automotive practice shows evidence of high and low levels of informal control. Therefore, this study specifically investigates how the MCS of automotive MSRs is designed.

Yet, besides illustrating MCS design, this paper contributes to explaining MCS design of automotive MSRs. To our knowledge, little management control research specifically investigated contingency theory's explicative power in manufacturing.

Naturally, several papers study influences on MCS design in manufacturing environments, like the impact of manufacturing flexibility (Abernethy & Lillis, 1995), customization and related interdependence (Bouwens & Abernethy, 2000), profit centre strategy (Lillis, 2002), production strategy and production technology (van Veen-Dirks, 2006). However, these studies investigate characteristics explaining MCS design in one organization. Consequently, the design of MCSs that govern different types of inter-organizational supplier relationships involved in the manufacturing of complex products (Gietzmann, 1996) remains under-explored. Therefore, more attention towards explaining this type of MCS design is called for (Cooper & Slagmulder, 2004; Langfield-Smith & Smith, 2003; van der Meer-Kooistra & Vosselman, 2006). This paper answers that call by tailoring contingency theory to the setting of MSRs. To that end, we propose a refined theoretical contingency framework based on recent inter-organizational management control theory, but specifically adapted for the manufacturing phase. This framework proposes several contingencies determining the level of risks, which are governed by different levels of management control techniques.

In order to illustrate the validity of the framework in practice and answer how and why automakers design their MCS, we perform an in-depth explanatory case study of the relations between a facility (VCG) of the international OEM Volvo Cars Corporation and a selection of its first-tier supplier facilities. The case study provides considerable evidence of three supplier types, namely batch, low value-added just-in-sequence and high value-added just-in-sequence suppliers, visualizing the associations in the framework between contingencies, risks and management controls. These controls include both formal and informal techniques, of which trust building and social pressure are highly valued. Most notably, VCG's structured supplier team functions as a clan and establishes informal control among participating suppliers, which strengthens control on the OEM's dyadic supplier relations. As our framework draws on case findings from other less formal IORs, our case findings offer more evidence of their external validity. That way, the findings contradict that informal controls play a minor role in automotive MSRs.

The remainder of this paper is organized as follows. In the second part, we develop the theoretical contingency framework. The third part describes the case research methodology. The fourth part is the actual case study, which presents VCG, describes three supplier types by means of contingency levels and clarifies how VCG designed the MCS governing them. In the fifth part, we discuss our findings by comparing VCG's management control with previous findings and elaborating on the significance of VCG's supplier team. We conclude the paper with a summary of the main findings and some avenues for further research.

2 THEORETICAL FRAMEWORK

In this part, we develop a theoretical contingency framework for MCS design of MSRs, which can be found in figure 1.1.

Insert Figure 1.1 About Here

Contingency theory originated with the aim of explaining the structure of organizations by particular circumstances. Later, management accounting researchers adopted and further developed the theory in order to explain the shape of MCSs in organizations (e.g. Chenhall, 2003; Luft & Shields, 2003). Therefore, contingency theory suits this study, regarding MCS design of MSRs and its explicative variables. The central concept of the framework is the level of risk a certain MSR runs. Inter-organizational management control theory proposes two types of risk, which result from five different situational antecedents, characterizing the MSR. Although we clarify both risk types separately, we stress the integrative interpretation of all contingencies, jointly determining both levels of risk. Subsequently, this risk is governed by different management control instruments, either with a large or a small role for informal control.[3]

[3] According to van Veen-Dirks (2006), all situational characteristics and MCS characteristics are determined jointly instead of sequentially. Also Kamminga & van der Meer-Kooistra (2007) propose that the influence of contingencies is not determined by each antecedent as such, but by their interaction. In addition, they suggest studying control as an integrative concept, in which all control dimensions are incorporated. Consequently, we do not propose one-on-one associations between one specific contingency, one specific type of risk and one specific type of control, suggested to suit that risk type. Instead, our model simultaneously studies the associations between situational contingencies, risks and management control techniques.

2.1 Performance risk

The first risk type is *performance risk*, defined as the probability of not achieving the MSR objectives, despite satisfactory cooperation (Das & Teng, 2001). This type of risk is also referred to as "coordination requirements" (Dekker, 2004; Gulati & Singh, 1998). As the MSR objective concerns manufacturing as many products of the order book as possible, on time, with good quality and at the lowest possible cost, performance risk is the risk of a supply chain interruption, disturbing the realisation of this goal. Three contingencies related to technology increase this risk, namely complexity, task uncertainty and task interdependence (Chenhall, 2003). Yet as complexity and task uncertainty are highly related (Chenhall, 2003), the framework does not include complexity separately (cf Dekker, 2004).

Task uncertainty refers to variability in transformation tasks and the available knowledge of methods for performing those tasks (Chenhall, 2003). This situational characteristic determines the measurability difficulty of output and activities (Kamminga & van der Meer-Kooistra, 2007; van der Meer-Kooistra & Vosselman, 2000), which increases with increasing levels of complexity of both the delivered product and its operational processes (Woodward, 1965). The first complexity is related to the added value of the product and gradually increases depending on whether the supplier delivers a standard component or an important customized module (Cooper & Slagmulder, 2004). The second complexity regards the added value of the production process and reflects the complexity of the supplier's manufacturing processes, needed to effectively produce and deliver the products as required.

Task interdependence relates to the degree to which subactivities of the value creation process have been split up and made dependent on each other (Dekker, 2004). In MSRs, this interdependence is sequential (Thompson, 1967)[4], because the relation involves transferring the supplier's output to the manufacturer's input process. The level of sequential interdependence is impacted by the dependence level of the manufacturer's operational performance on the supply quality (timeliness and product quality). Moreover, the interdependence level of a specific MSR is influenced by the production flexibility required from both parties and the manufacturer's lack of precise knowledge to perform activities previously done in-house.

[4] Thompson (1967) identifies three levels of task interdependence from low to high, which influence the level of inter-organizational coordination and communication: pooled, sequential and reciprocal interdependence.

2.2 Relational risk

The second type of risk is *relational risk*, implying the probability of not having satisfactory cooperation because of opportunistic behaviour of the supplier, exemplified in shirking, cheating, distorting information and appropriating resources (Das and Teng, 2001). This type of risk is also referred to as "appropriation concerns" (Dekker, 2004; Gulati & Singh, 1998). Transaction cost economics (TCE) theory[5] proposes three contingencies that influence relational risk and subsequently determine appropriate control: asset specificity, environmental uncertainty and transaction frequency (Williamson, 1979). Yet, as the manufacturer possesses no specific assets related to a certain supplier, at least not in the manufacturing phase of the supply chain, there is no lock-in to supplier opportunistic behaviour.[6] Hence, unlike uncertainty and transaction frequency, asset specificity does not influence supplier opportunistic behaviour in MSRs and is not included in our theoretical framework.

Consistent with being a central contingency research variable, *environmental uncertainty* also forms a powerful characteristic of MSRs (Chenhall, 2003). In particular, this contingency relates to general market uncertainties and uncertainty about unknown future contingencies (Kamminga & van der Meer-Kooistra, 2007; Langfield-Smith & Smith, 2003; van der Meer-Kooistra & Vosselman, 2000). Because manufacturer and supplier interact under these uncertainties, both parties face changes over time, which require detailed contracts (Dekker, 2004). However, incomplete contract theory argues that there exist limitations in drawing up complete contracts, because all future contingencies can not be foreseen, are too expensive to foresee or are too expensive or impossible to contract upon (Gietzmann, 1996). Consequently, the combination of uncertainty and incomplete contracts leads to potential opportunistic behaviour of the supplier.

[5] TCE argues that parties are only boundedly rational and behave opportunistically. Therefore, the total cost of outsourcing is the sum of both the supplied component costs and the transaction costs, including costs for negotiation, drawing up contracts, coordination, control and risk of opportunistic behaviour (van der Meer-Kooistra & Vosselman, 2000).

[6] Obviously, suppliers do have specific assets in place, rendering them vulnerable to opportunistic behaviour from the part of the manufacturer. However, this study and the developed theoretical framework only focus on supplier opportunistic behaviour.

According to TCE, more frequent interactions lower the possibility of opportunistic behaviour (Williamson, 1979). So, to preserve a positive relation between contingencies and relational risk, we could utilize infrequency as contingency variable (e.g. Anderson & Dekker, 2005). Yet, as we study MSRs with no connection to commercial negotiations determining the contract term, we include the antecedent *relational stability aim.* This contingency relates to the manufacturer's aim of continued future interactions with the supplier and serves to build bilateral commitment (Cooper & Slagmulder, 2004). We argue that MSRs, in which relational stability is considered necessary and thus aspired by the manufacturer, are subject to higher relational risk. For example, if supplier switching costs are high due to high interdependence, high commitment from the manufacturer could incite the supplier to accept lower quality or delivery performance.

Besides including a transaction environment characteristic and a transaction characteristic, we also incorporate a transaction party characteristic (Langfield-Smith & Smith, 2003; van der Meer-Kooistra & Vosselman, 2000). In particular, we include *supplier knowledge importance*, which encompasses the degree of importance for the manufacturer to know the supplier and to be able to assess characteristics, such as trustworthiness and willingness to share proprietary knowledge. Usually, this kind of assessment is done by means of first-hand or second-hand experience. Hence, we argue that when the importance of supplier knowledge rises, the risk for insufficient or erroneous assessment and subsequent supplier opportunistic behaviour increases.

2.3 Management control system

Although MCSs have been conceptualised and categorised in various ways, the current management control literature has reached a consensus on two types of management controls, namely formal and informal control instruments (Langfield-Smith & Smith, 2003). Obviously, studying the usage of informal controls compared to formal controls requires both control types to be included in the theoretical framework.

Formal controls are explicitly set up to coordinate the MSR and include outcome controls and behaviour controls. *Outcome controls* involve the measurement and evaluation of the outcomes of operations against pre-defined outcomes or targets, by using several performance measurement techniques (Dekker, 2004; Merchant, 1998; Ouchi, 1979). The most important outcome metrics for MSRs are percentage of defects, quality of delivered goods and on time delivery of goods (Gunasekaran, Patel & McGaughey, 2004).

Behaviour controls concern the specification and actual surveillance of behaviour by means of rules and standard procedures (Merchant, 1998; Ouchi, 1979). Additionally, behaviour controls include evaluating compliance with pre-specified planning, procedures, rules and regulations (Dekker, 2004).

Informal controls (also called social controls) are not explicitly designed, but are grown out of shared norms and values, shaped by frequent interaction, meetings and management attitude (Merchant, 1998; Ouchi, 1979). Especially *trust building*[7] has emerged as an important informal control instrument in inter-organizational MCSs (e.g. Dekker, 2004). While formal controls reduce risks by altering the incentives for underperformance or opportunism, trust building mitigates these risks by minimizing the fear of underperformance or opportunism to occur (Das and Teng 2001). Therefore, we include three types of inter-organizational trust building, namely building contractual trust, competence trust and goodwill trust (Sako, 1992).[8] Contractual trust results from previous contractual relations or grows during the MSR (Sako, 1992). Competence trust is increased by previous good performance, i.e. good quality and delivery results. Moreover, competence trust results from buying products from reputable suppliers or transferring competences to the supplier. Additionally, product and/or process certification and process standardisation enhance competence trust (Sako, 1992). To develop goodwill trust, Sako (1992) identifies shared values and norms as necessary, but insufficient, because transaction parties also need to show the willingness to be indebted to each other. Gulati (1995) stresses creating and growing an inter-organizational bond of friendship to trigger goodwill trust (Gulati, 1995).

[7] Rousseau, Sitkin, Burt & Camerer (1998, p. 395) define trust as "a psychological state comprising the intention to accept vulnerability, based upon positive expectations of the intentions or behaviour of another". According to them "trust is not a *behaviour* (e.g. cooperation), or a *choice* (e.g. taking a risk), but an underlying *psychological condition* that can cause or result from such actions" (Rousseau et al., 1998, p. 395; italics added). As such, trust in itself can not be a control *instrument* in the MCS of MSRs. Instead, the control techniques are the *actions* the manufacturer performs to create and build trust in the supplier.

[8] Contractual trust is based on the expectation that the supplier will keep promises and comply with agreements made, whether these are contractually stipulated or not. Competence trust concerns the expectation that the supplier possesses the necessary technical and managerial competences to deliver the order as agreed. Goodwill trust regards the expectation that the supplier shares an open commitment, with the willingness to perform activities that are beneficial to the MSR, but possibly neither in the supplier's interest nor required by the contract (Sako, 1992).

Other possible goodwill trust initiators are interactive goal setting, trustworthiness reputation and a long term relationship (Dekker, 2004). Next to these specific trust building mechanisms, the literature also proposes an important generic trust building technique, namely close interaction based on mutual interests and established by means of joint decision making and joint problem solving via a joint relationship board and/or joint task groups (Das & Teng, 2001; Dekker, 2004).[9]

Besides trust building, MSRs can be governed by another type of informal control, which Ouchi (1979) refers to as *clan control.* Based on shared norms, values and a common inter-organizational goal, supplier behaviour in the interest of the MSR will be reinforced, because suppliers are motivated to achieve the goal (Das & Teng, 2001). This incentive results from inter-organizational *social pressure* (Speklé, 2001) exerted by the manufacturer, which we believe is social control in its literal meaning. Because of high interdependence between manufacturer and supplier, below standard results of the supplier directly impact the manufacturer's performance. Consequently, supplier management is unpleasantly confronted with manufacturer management and faces personal humiliation because of the error. Additionally, supplier management runs the risk of their reputation and personal relationship with interacting manufacturer management getting injured. Also Dyer & Singh (1998) mention reputation and personal relations as social control mechanisms, besides norms and trust. By acting as negatively valued social sanctions (Bijlsma-Frankema & Costa, 2005), these social consequences create incentives for satisfactory supplier performance and render supplier underperformance and opportunism hard to sustain (Speklé, 2001). If we assume operational snags to be day-to-day business in MSRs, this social pressure creates an informal means to mitigate risk in MSRs.

[9] Other potential generic trust building techniques in a MSR are communication via regular inter-organizational meetings (Chalos & O'Connor, 2004; Das & Teng, 2001), information sharing of problem areas (Chalos & O'Connor, 2004), supplier development activities (Carr & Ng, 1995), networking (Das & Teng, 2001), training (Chalos & O'Connor, 2004) and the extent to which the employees of both parties understand the factors ensuring the collaboration's future success (Chalos & O'Connor, 2004).

3 RESEARCH METHODOLOGY

3.1 Case study research

The empirical part of this paper is based on an in-depth case study, which is an investigation of a real life phenomenon, relying on multiple sources of evidence and benefiting from prior development of theoretical propositions (Yin, 2003). An explanatory case study suits our research that concerns refining existing inter-organizational management control theory for the relatively under-explored manufacturing phase of the supply chain.[10] According to Keating (1995), such theory refinement needs a clear theoretical starting point, supplemented with openness to the discovery of unexpected findings. To balance these *theory attachment* and *detachment* requirements, we developed a theoretical framework to guide the data collection, but at the same time used data collection techniques allowing sufficient openness. Based on the data, we assessed the explanatory power of the theoretical framework.

Furthermore, several inter-organizational management control case studies (e.g. Cooper & Slagmulder, 2004; Dekker, 2004; Kamminga & van der Meer-Kooistra, 2007; Nicholson et al., 2006) strengthen the argument that cases allow investigating in detail the structure and influencing variables of IORs (Sartorius & Kirsten, 2005). These studies demonstrate that MCS design can be adequately investigated by means of qualitative research. The social meaning of inter-organizational MCSs, especially regarding the use and interpretation of informal controls, and the subsequent behaviour of companies and employees is very complex. Therefore, an in-depth study is needed to discover how different parties interpret certain IORs and whether the MCS is designed accordingly. This argument not only justifies the choice for a case study, but also forms the reason why more of this research is requested (e.g. Langfield-Smith & Smith, 2003; Dekker, 2004; van der Meer-Kooistra & Vosselman, 2006).

[10] More specifically, our research corresponds to investigating a complex phenomenon within its real life context, of which empirical evidence is rather limited, and answering how and why questions about this phenomenon, for which an explanatory case study design is most suited (Eisenhardt, 1989; Yin, 2003). Furthermore, our *theory refinement* goal represents the middle ground between *theory discovery*, i.e. describing novel phenomena, and *theory refutation*, i.e. disconfirming well specified theories by bringing in negative evidence (Keating, 1995). More specifically, our case research is of the *theory illustration* type, documenting "previously unappreciated aspects of management accounting practice" and identifying "aspects of the illustrated theory that require reformulation or more rigorous specification" (Keating, 1995, p. 71). Indeed, the goal of this study is to illustrate how manufacturers design supplier MCSs, how important informal controls are in that design and how the design can be explained by means of a specifically adapted theoretical framework.

Like most inter-organizational studies, the unit of analysis consists of dyadic relationships between manufacturer and supplier (van der Meer-Kooistra & Vosselman, 2006). Dyer & Singh (1998) explicitly propose this "relational view", focusing on the manufacturer-supplier dyad, as opposed to the "industry structure view" and "resource based view", when analyzing cooperative strategy and sources of inter-organizational competitive advantage. In order to answer the proposed research questions concerning MSR MCS design, we analyzed all relations after the manufacturer had decided to outsource the manufacturing activities. In other words, we addressed neither the make-or-buy decision nor related commercial negotiations, but collected data from the start of production onwards. Furthermore, we only gathered data on standard MCSs for MSRs with good operational performance.

3.2 Case company selection

The selection of the case company and its suppliers was influenced by two selection concerns: theoretical sampling (Eisenhardt, 1989) and open and flexible access to senior management. Based on these concerns, we chose the Volvo Cars Gent (VCG) production facility of the Swedish Volvo Cars Corporation as manufacturing case company. On the one hand, VCG was chosen because exploratory interviews learned that the OEM is considered a "best practice"[11] by financial analysts, suppliers and umbrella organizations. For example, with respect to suppliers' capability for build-to-order, VCG's supplier park was evaluated best in a comparative case study, also including supplier parks of e.g. Ford, General Motors and Audi (Howard, 2006). On the other hand, VCG management showed remarkable openness, interest in the research topic and willingness to cooperate. Obviously, the selection of case suppliers was based on the same selection concerns. Taking into account differences found at VCG and discussions with VCG management about supplier appropriateness (i.e. theoretical sampling) and participation willingness, eight VCG supplier manufacturing facilities were chosen. This way, we were able to investigate VCG's MCS of different MSRs, with data from both parties.

[11] VCG is financially healthy, operationally profitable and highly appraised in the international automotive sector. Additionally, VCG's supply is evaluated one of the best in automotive benchmark studies. Furthermore, VCC and in particular VCG are positively evaluated by suppliers regarding their approach towards them. Finally, also umbrella organizations, able to compare their members' different supplier relationship approaches, are in favour of VCG's MSRs.

3.3 Data collection

The main data gathering technique consisted of 26 semi-structured interviews with high level managers of both VCG and the selected suppliers. These interviews were held in three rounds between February 2006 and October 2006. Hence, the validity of the observations described in this paper relates to that period. First, all VCG managers involved with suppliers were interviewed, including responsibles for quality, logistics, logistic engineering, material planning, IT, HR and purchase. That way, we got a general impression of VCG, its suppliers and its MCS. Next, we interviewed supplier managers, in particular plant managers or VCG responsibles. Finally, we re-interviewed specific VCG managers most involved with suppliers spoken to in round two. Table 1.1 provides an interview data summary, describing the organization and position of the interviewees, the number of interviews, the duration of the interviews and the interview dates.

The interviews aimed at building a trusting relationship and developing a dialogue with the interviewees, which permitted them to discuss their own concerns. All interviews were tape recorded electronically and structured by an interview protocol with open-ended questions, based on the theoretical framework and tailored to fit the interviewee's organization and responsibility (cf appendix for a general interview protocol of interview rounds two and three). This approach allowed covering all framework constructs (i.e. theory attachment), while at the same time preserving openness for new findings (i.e. theory detachment). Interviews lasted between three quarters of an hour and three hours, with an average duration of approximately one hour and a half. Afterwards, all taped interviews were transcribed and sent back to the interviewees for feedback and final approval. This feedback was subsequently transcribed as well. Interview transcripts were written in prose, as to avoid offending interviewees by literally transcribing their words on a sensitive topic. Furthermore, by writing in prose, we were able to immediately write out certain parts of the interview that were not entirely clear on the tape. As the interviewees approved the final transcript, we received absolute certainty on the written document and all interpretations made during transcribing.

Finally, we supplemented the interview data with archival research of internal and public data, such as company presentations, meeting minutes, supplier performance data, supplier syllabi, annual reports and news articles. These archival data allowed triangulating different findings from different methods, rendering conclusions more reliable and convincing (Yin, 2003).

3.4 Data analysis

The data analysis followed a structured iterative approach. Already during interview transcribing, a first analysis was performed by highlighting parts of the transcript and writing down comments and related personal ideas.

Then, both transcripts and personal notes formed the basis for a second analysis, which was completely done by hand. The most important techniques to enhance theoretical sensitivity during the coding process were asking questions (who?, what?, when?, where?, why? and how?) and making comparisons (Strauss & Corbin, 1999). Also the tape recorder was utilised in order to capture facts and findings coming up during the analysis. As with interviews, these tapes were subsequently transcribed and further studied. Finally, this second analysis resulted in an elaborate document, containing coded transcript extracts related to the theoretical constructs found in the data. Together with the rich collection of original data, this document was used for writing up the case study and discussing its findings. Both case study and discussion were approved for publication by VCG, without having to make changes.

Due to lack of space, the following case study only describes our findings in terms of the framework, so without direct reference to the rich set of unique case data. Yet, to indicate the origin of this description, we grouped some exemplary interview quotes in three tables provided in the next part.

4 CASE STUDY: VOLVO CARS GENT

4.1 Case company description

Volvo Cars Gent (VCG) is the largest manufacturing unit of Volvo Cars Corporation (VCC), a Swedish automotive OEM owned by Ford Motor Company. In 2005, this company employed 5.025 people, had a turnover of about €4,2 billion and produced 258.479 cars. The production was spread over four Volvo models, namely the S40, V50, S60 and V70. All models are built on only one assembly line, which requires ultimate flexibility of all assembly processes. Production starts in the welding factory, where pressed steel plates from Volvo's press factories are welded together into a car body. In the paint shop, welded bodyworks are provided with various paint and protective coatings. During final assembly, the painted bodywork becomes a car with fitted interior elements, such as seats, and mechanical components, like suspensions. The relations with suppliers of these products for final assembly are this study's subject.

Similar to other OEMs, production philosophy at VCG evolved from *push* (i.e. build-to-stock), to *pull* (i.e. build-to-order). Yet, this new approach created both an explosion of possible cars, for which stocking all components was physically and financially impossible, and the possibility for customers to make very late order changes. Hence, VCG needed flexible manufacturing and ordering, and outsourcing of manufacturing activities to reliable suppliers. By 2003, 20 suppliers delivered 78% of total material volume and 77% of total material value. These suppliers set up shop in VCG's neighbourhood in order to reduce transport costs and facilitate fast problem solving. Moreover, most suppliers jointly work in a *supply-in-line-sequence centre*, i.e. a supplier park, operated by a logistic provider and located five kilometres from VCG, which offers advantages such as limited overhead costs, competence sharing and joint transport. The most important advantage of local supply, however, is the possibility for suppliers to produce and deliver components both "just-in-time" (JIT), i.e. when the car for which the components are intended has come on VCG's production line, and "in-sequence", i.e. in the same order as the cars on VCG's production line.

Because of local supply's strategic importance in making *just-in-sequence* (JIS) supply feasible, VCG set up the *Suppliers Team Volvo Cars* (STVC) to exchange information with JIS suppliers. The purposes of the STVC are creating openness and sharing competencies by the exchange of real life experiences in order to improve manufacturing. To this end, all supplier plant managers attend a monthly STVC meeting in order to get to know each other, exchange VCG information (VCG planning, Volvo sales, automotive trends, etc.), jointly consider common problems and improvement programs, and set up and follow up on specific workgroup projects. Examples of common improvements are jointly buying electricity and increasing supplier park safety. Under the overall STVC, of which the chairman is a supplier plant manager, five inter-organizational workgroups exist, namely for quality, logistics, HR, IT and finance. Workgroup participants meet monthly at one of the supplier facilities to visit the company and discuss problems and improvements. Examples of discussion themes are correct sequencing, milk rounds, employee absenteeism, a monitoring and back-up procedure test of EDI communication and automatic invoicing.

4.2 Management control system of supplier relationships

Our data contain substantial evidence of three supplier types in manufacturing that are characterized by different contingency levels, namely *batch* suppliers, *low value-added* (LVA) *just-in-sequence* (JIS) suppliers and *high value-added* (HVA) *just-in-sequence* (JIS) suppliers. In order to better understand how risk is influenced by the contingencies, we first clarify VCG's performance and relational risk. Then, we discuss the contingencies one by one, before indicating how the resulting risk level is governed by both formal and informal management controls. A summary of the results can be found in figure 1.2.

Insert Figure 1.2 About Here

4.2.1 Risks

In MSRs, risk relates to potential problems concerning manufacturing and supporting processes like logistics and IT. In that respect, VCG is most concerned with the performance risk of a MSR, which is the probability that such an operational snag occurs in the supplier's production or logistics processes and disturbs supply chain continuity and VCG manufacturing. In other words, performance risk is the risk that a supplier is not capable of keeping the promise of delivering the right goods of the right quality at the right time. Based on the levels of task uncertainty and task interdependence, we find performance risk of batch suppliers to be lower than the risk of LVA JIS suppliers. The level of this latter risk, in turn, is lower than the HVA JIS suppliers' risk.

Relational risk in the MSR regards the probability of supplier opportunistic behaviour. VCG considers this risk type to be the risk that (even potential) operational snags are not openly communicated or minimized, so that problem solving time is lost and the problem escalates. Additionally, shirking one's responsibility in case of a snag is a second appropriation concern for VCG managers. Although the first opportunism type damages VCG manufacturing most, also the second type results in worthless discussions, seriously hampering manufacturer-supplier interaction. By studying environmental uncertainty, relational stability aim and supplier knowledge importance, we find a similar ordering for relational risk, namely lowest for batch suppliers, highest for HVA JIS suppliers and somewhere in between for LVA JIS suppliers.

4.2.2 Contingencies

VCG and supplier management refer to process and product complexity to differentiate between supplier types. Batch suppliers deliver products in large quantities on a regular basis from facilities all over the world. JIS suppliers are located in the neighbourhood of VCG and deliver just-in-time and in-sequence, which is much more complex. Although many batch suppliers deliver simple parts, like plastic pieces, some batch suppliers deliver more complex products, such as electronic devices. However, all batch suppliers deliver standard components, which are not called off for a specific car. LVA JIS suppliers, however, deliver customized components. Their manufacturing activities are low value-added, because they primarily aim at variant creation, after which all parts are sequenced and delivered just-in-time. Supplying back shelves is a good LVA example, because manufacturing stays limited to punching holes for speakers. Concerning delivery, HVA JIS suppliers are comparable to LVA JIS suppliers. Yet, these suppliers assemble modules such as car seats, so that their processes add considerably more value. To that end, HVA JIS suppliers operate large facilities with many employees engaged in complex processes. Furthermore, modules like dashboards are characterized by lower output measurability compared to batch and LVA JIS products, which results in extra difficulties in case of unsatisfactory quality. Because HVA JIS suppliers deliver the most complex modules by means of the most complex production and supply system, performance risk is highest.

Because of just-in-sequence delivery, the interdependence between JIS suppliers and VCG is high; or at least considerably *higher* than between VCG and batch suppliers. All JIS suppliers work in harmony with VCG like the cogwheels of a watch, because if one supplier disturbs the continuous delivery flow, not only VCG but also other JIS suppliers suffer. Severe supply problems stop VCG's assembly line, producing a car every 61 seconds. As all JIS suppliers exclusively deliver VCG and only receive EDI orders during running production, their production will inevitably suffer (in the worst case stop) as well. Hence, VCG's and JIS suppliers' performance entirely depends on the performance of all JIS suppliers. Additionally, JIS suppliers must be highly flexible because of pull production and heavily fluctuating automotive demand (cf environmental uncertainty). Furthermore, HVA JIS suppliers operate complex processes, which are more *core competences* than the variant creation processes of LVA JIS suppliers. Consequently, VCG lacks sufficient knowledge to effectively and efficiently perform these HVA activities.

The automotive industry probably experiences its highest competitive level ever. According to all parties involved, environmental uncertainty has become the new standard. Hence, VCG's JIS suppliers' market uncertainty is high, because their performance completely depends on Volvo's market demand, which sometimes heavily fluctuates. In addition, there are two unknown future contingencies, substantially impacting the relation with JIS suppliers. On the one hand, VCG continuously bears the risk of being closed down by its mother company VCC/Ford in case of a performance decrease. On the other hand, the VCC/Ford purchase department can always decide not to resource the current supplier. Consequently, both VCG and suppliers continuously need to prove themselves towards their mothers, who benchmark them against their colleague facilities. This competition between colleagues increases environmental uncertainty to stimulate continuous improvement. As a result, VCG needs to safeguard its high performance level at all times and needs suppliers not to behave opportunistically. Suppliers, however, face similar performance pressure from their own mother companies. Because of that, they are tempted to hide operational snags from VCG and try to solve problems themselves in order to prevent their negative performance from being noticed and registered. In other words, environmental uncertainty is a very important contingency influencing relational risk. Although also batch suppliers face these environmental uncertainties, their impact is much smaller, because the effect from VCG is mitigated by supplying other automotive OEMs and other industries.

VCG generally cooperates with suppliers and helps them facing problems. VCG truly strives for long term relational stability, because the OEM is aware that the interdependence, which is higher with JIS suppliers, considerably impacts performance. To put it simply, if the supplier is in trouble, VCG is in trouble as well. So, as all JIS suppliers need to work in utmost harmony with VCG, the OEM prefers stable over changing MSRs, even when they are underperforming for a long time. VCG beliefs that assisting suppliers minimizes the possibility of (further) damage to VCG's production. Consequently, JIS suppliers receive much bilateral cooperation to solve problems quickly. The location of most JIS suppliers in the supplier park provides opportunities for such problem solving and process ameliorations. Although VCG also assists batch suppliers in severe problems, the OEM values stability most for HVA JIS suppliers, as their interdependence is highest. Obviously, this attitude makes VCG more vulnerable to opportunistic behaviour from HVA JIS suppliers. As these suppliers know VCG strives for relational stability, their fear for retaliation, resulting from disclosed opportunism, is lower.

Finally, our data show that VCG managers value good supplier knowledge most in case of HVA JIS suppliers. Yet, this does not mean that VCG assesses JIS supplier's competence reputation on a firm level basis. That is the responsibility of the VCC/Ford purchase department during supplier selection. Instead, VCG evaluates suppliers on a person level basis and gathers information about supplier plant managers, concerning trustworthiness and willingness to share proprietary knowledge. These managers play a central role in the MSR, as they need to guarantee good performance by interacting with several parties involved, including VCG management, supplier mother company management and supplier employees. The importance of VCG's plant manager knowledge is exemplified by the fact that VCG not only follows their appointment from close by, but also suggests appropriate candidates to supplier mother companies. For HVA JIS suppliers, with a larger management staff than LVA JIS suppliers, the same importance is given to partner knowledge of middle management. For example, if a supplier quality manager appears unwilling to share proprietary information concerning quality (problems), VCG's interacting quality manager will highlight this personal attitude by escalating the supplier to step two of the escalating activities procedure[12], even when no substantial quality problems have occurred. This reflects the considerable impact of this contingency on VCG's relational risk with HVA JIS suppliers. It speaks for itself that VCG is not interested in the plant manager of batch suppliers. In most cases, especially when the supplier's facility is located abroad, VCG managers do not even know who actually leads the plant.

Exemplary interview quotes concerning VCG's MSR contingencies and risks can be found in table 1.2.13

Insert Table 1.2 About Here

[12] The escalating activities procedure is a VCG procedure used to escalate suppliers experiencing operational difficulties. The aim is to indicate both internally (at VCG and VCC) and externally (to the supplier) that VCG is aware of the problems and installs adequate measures to help solving them. Those measures depend on the snag seriousness and are linked to the step the supplier is escalated in. Standard, all JIS suppliers are in step one, while batch suppliers are in step zero. When encountering frequent problems with a supplier, VCG managers escalate the supplier to the next step. If the problem is not solved after a pre-defined period of time, the supplier is further escalated. The procedure ends when a supplier either reaches step five, which theoretically implies re-evaluation and potential re-sourcing of his products, or substantially improves so that he returns to step one (zero for batch).

[13] When interviewees refer to "Volvo", they actually mean "Volvo Cars Gent" or (as we put it in the text) "VCG".

4.2.3 Management control system

4.2.3.1 Outcome control

All VCG suppliers are subject to considerable outcome controls, more specifically in the form of *key performance indicators* (KPIs). These KPIs make up VCG's standard outcome control for suppliers not involved in VCG's escalating activities procedure. Undoubtedly, the most important KPI in automotive, and thus at VCG, is *parts-per-million* (PPM), indicating how many parts delivered do not comply with the agreed upon 100% quality specifications out of one million parts delivered. Additionally, JIS suppliers' quality performance is assessed by *car audit remarks*[14], for which the most complex HVA products, like car seats and dashboards, receive specific audit demerit targets. It speaks for itself that own targets result in a higher level of outcome monitoring and evaluating, which is confirmed by the quality manager, who indicates that problem response time is shortest for HVA JIS suppliers. Other important KPIs are related to logistics. The first one, *number of missing parts* (MPs), measures the number of parts that did not arrive at VCG in time and/or in the correct sequence. The second indicator, *line stop minutes*, registers the number of minutes that a supplier caused stoppage of the VCG production line. Third, *dropped cars* are cars dropped from VCG's line planning, because the supplier is unable to deliver the requested part.[15] Finally, batch suppliers are subject to a *delivery precision* registration, measuring the amount and timeliness of deliveries.

VCG emphasizes uniformity in measuring supplier performance based on the most important KPIs, which are PPM, MPs and lines stop minutes. However, our data still show a substantial difference between batch and JIS suppliers; not in the KPIs utilized, but in the management process behind the KPIs, which is more complex for JIS suppliers. First, the response time in case of deviation from target is much shorter for JIS suppliers. Second, the PPM rate of JIS suppliers is followed-up monthly, while the PPM rate of batch suppliers is only taken into consideration in case of a severe operational snag. Furthermore, the penalty procedure is more straightforward for batch suppliers. Contrary to JIS suppliers, batch suppliers receive a pre-defined financial penalty for technical quality problems.

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[14] Every day, five to eight finished cars are audited by VCG personnel, who report negative audit remarks of four types: B10, B30, A70 and S300. The number behind the type of remark is the number of demerit points associated to the identified deficiency, which reflects the seriousness of the found demerit. In that respect, VCG targets an average of 35 demerits per car.

[15] Obviously, delivering missing parts by incorrect sequencing is only possible for JIS suppliers. Similarly, line stops and dropped cars can only be caused by suppliers delivering parts without which a car can not be further assembled.

Also line stop minutes are responded to more severely when caused by batch suppliers, who receive an invoice that covers VCG losses and costs. Such penalties for JIS supplier are always negotiable and the compensation demand decision is tailor-made. Apparently, VCG is aware of the higher complexity and flexibility of JIS suppliers and takes that into account for evaluation.

4.2.3.2 Behaviour control

VCG's most important behaviour control on JIS suppliers is certainly the syllabus. This document contains all agreements regarding the basic routines of day-to-day operational business, for example how the product should be transported and how EDI communication should be controlled. Especially in case of operational snags, the syllabus prescribes which actions should be taken, including who to notify and how to prevent the problem from escalating. For example, if the supplier is unable to load trucks as required, he should arrange a rush transport. Also when the EDI system breaks down, the supplier should follow the back-up routines prescribed in the syllabus. Additionally, the syllabus contains the requirement to hold the necessary certifications, including ISO-TS. Reflecting their larger process complexity, HVA JIS suppliers' syllabi contain specialized extensions compared to the ones of LVA JIS suppliers. As batch supplier relations are not as risky as JIS relations, VCG does not draw up syllabi with batch suppliers.[16]

Also supplier follow-up substantially differs between supplier types. Clearly, HVA JIS suppliers are most intensively followed up, because VCG quality and logistic engineers monitor suppliers and solve operational problems on a daily basis. The fact that VCG's logistics department is organized by a workload score, in which HVA JIS suppliers receive a standard ten points and LVA JIS suppliers only two or five, exemplifies the difference. Furthermore, HVA JIS suppliers are visited weekly or two times per week, while LVA JIS suppliers are only visited monthly or once every couple of months. When nothing disturbs the delivery flow from these suppliers, VCG feels no need to control their behaviour. The same approach holds for HVA JIS suppliers, of which the ones without substantial problems in the recent past are visited considerably less, but never less than once a month.

[16] Moreover, because such local operational agreements can not be negotiated by the VCC/Ford purchase department, the syllabus is entirely set up by VCG and the suppliers. Hence, although both parties sign the document and engage themselves in complying with the agreed terms, the syllabus is not part of the target agreement with the supplier, which renders it legally unenforceable.

Undoubtedly, batch suppliers receive lowest follow-up by VCG. VCG only deals with batch suppliers and visits their facility in case of a severe operational snag that the supplier does not get solved. Nevertheless, these batch supplier visits remain rather exceptional.

During supplier follow-up and supplier company visits, VCG expects JIS suppliers to openly share information in order to achieve efficient cooperative problem solving. These suppliers are asked to document operational processes, control systems and related problems, because JIS supply is impossible without information sharing. As VCG and JIS suppliers are highly mutually dependent, any type of restraint towards opening up own processes unnecessarily hinders the MSR. In order to explicitly stimulate such information sharing, VCG installed the STVC, currently led by the credo “Dare to Share!”. As VCG wants to set a good example, the OEM shares a considerable amount of information, depending on the level of interdependence. JIS suppliers are informed regularly on issues affecting VCG’s and thus the suppliers’ production; not only on the operational, but also on the strategic level. The actual level of information sharing is more extensive with HVA JIS suppliers, although mother company characteristics further differentiate suppliers. As batch suppliers are not affected by operational changes (e.g. line speed changes), they do not receive operational information. Also strategic information, like sales expectations and hence future production volumes, is not shared with batch suppliers, as their production schedule is far less dependent on that of VCG alone.

Exemplary interview quotes regarding VCG’s formal management controls can be found in table 1.3.

Insert Table 1.3 About Here

4.2.3.3 Informal controls

Trust building

Contractual trust building

Contractual trust constitutes the basic type of trust in VCG's MSRs. VCG managers indicate they at least need to be able to trust their suppliers to execute agreements made. If VCG discusses process changes, improvements or problem solutions and a decision is made, the OEM always trusts the supplier to comply with the agreement, even when oral promises are not put on paper. Consequently, our data show that the level of this type of trust building does not differ between batch, LVA JIS and HVA JIS suppliers. VCG trusts all suppliers to act as agreed upon and continuously builds this trust on positive experiences.

Moreover, VCG stresses that without this trust, collaboration with a particular supplier manager becomes impossible. Indeed, interviewees indicate that this kind of trust is rather inter-personal instead of inter-organizational, because it depends on personal relationships with one or more managers. For that reason, longstanding personal relationships strengthen contractual trust in VCG's MSRs.

Competence trust building

Without betraying VCG's contractual trust, the supplier might be unable to comply with promises because of a lack of competence. In that case, the supplier is willing to perform the best he can and indeed does everything in its power to succeed, but still fails. In most cases, however, VCG trusts suppliers to succeed in delivering the goods as required and acting on changes or improvements as promised. This competence trust is considerably present for batch suppliers based on previous quality and delivery performance levels.

JIS suppliers, however, are trusted more because of VCG's closer performance and capabilities monitoring, which renders good performance more transparent. Obviously, this emphasis on JIS performance is aided by JIS suppliers' geographical proximity. As HVA JIS suppliers produce more complex products with more complex manufacturing processes, these suppliers have VCG's highest capability confidence; of course only on the assumption that all processes function well. In addition, VCG's competence trust is strengthened by the fact that JIS suppliers possess several process certifications, such as ISO-TS, which require considerable process standardization and are subject to monitoring by external auditors. Furthermore, competence trust in some HVA JIS suppliers has benefited from the fact that

VCG literally transferred their infrastructure and knowledge, in the form of assembly lines and employees, to the local supplier facility.

Contrary to contractual trust, the object of competence trust is not that clear. On the one hand, VCG seems to value (or doubt) competences of the supplier organization, implying both human capital and assets. On the other hand, VCG confirms that also manager competence influences VCG's competence trust.

Goodwill trust building

Besides contractual and competence trust, VCG and supplier managers strongly emphasize the importance of goodwill trust, or as they describe it: "trust that the supplier openly and honestly communicates problems, even potential ones, concerning quality, logistics, etc". As VCG managers admit to making mistakes themselves, which sometimes also harm suppliers and for which VCG is not liable, VCG feels indebted to suppliers to understand problem occurrence. Yet, in exchange for this understanding, VCG desires open communication about operational snags. Moreover, VCG trusts suppliers to provide that information even before a certain incident actually causes a problem. VCG does not want the supplier to ignore, minimize or conceal potential problems, because the consequences could substantially impact both VCG and other JIS suppliers. Additionally, VCG expects supplier management to take responsibility for mistakes, so that no time is wasted on identifying which party actually caused it. That way, all energy can be devoted to joint problem solving, sometimes even with assistance from other suppliers. Nevertheless, VCG acknowledges that suppliers are tempted to behave opportunistically, because informing the customer that the organization can not fulfil promises is neither pleasant, nor common practice. Moreover, these problems are recorded by VCG's formal controls and reported to VCC, the supplier's mother company and sometimes to the STVC.

However, VCG places considerable goodwill trust on supplier managers, which are again the prime object of this trust. VCG continuously shares and actively promotes its norms and values (quality, safety, environmental awareness, openness, fairness, empowerment and collaboration) during supplier interaction. Consequently, JIS suppliers are trusted to know that VCG values honest communication more than opportunistic ignorance, even when the problem is only potential with low occurrence chances. That way, operational problems do not necessarily deteriorate, but build goodwill trust when the supplier communicates openly. As performance risk is highest for HVA JIS suppliers, these suppliers are characterized by many problem solving opportunities for this goodwill trust building.

Furthermore, the more frequent interaction with HVA JIS suppliers builds an inter-organizational bond of friendship between VCG and HVA JIS supplier managers. Most relationships with these managers also appear to be longer, because some of them already worked in other functions at the same or other suppliers, or even at VCG. In that respect, we note that longstanding personal relations of ten to fifteen years are not exceptional and further increase goodwill trust. As personal relations with batch suppliers are limited because of less interaction, their goodwill trust is much lower. Nevertheless, VCG clearly indicates that they do trust this supplier type to share severe problems that (potentially) affect VCG production.

Generic trust building via the supplier team

Besides strengthening mechanisms for one specific type of trust between VCG and one specific supplier, our case study reveals a mechanism that specifically aims at building trust, namely the STVC. On both the overall STVC and the workgroup level, socializing (or networking) is put forward as an extremely important goal. For that purpose, every meeting starts with a joint lunch and ends with a joint drink, during which everybody can get to know each other personally and professionally. Yet, the actual goal of this socializing aspect is the creation of a strong bond with high trust. VCG and supplier managers confirm that by socializing the level of mutual trust has increased, so that in case of failure, parties quickly and openly work on a solution by helping each other, instead of placing blame and negotiating penalties to cover production losses.

Furthermore, the STVC forms a joint relationship board, i.e. a structured forum of close interaction between participants, in which mutual interests are established, problems are solved jointly and decisions are made together. Indeed, all STVC members, including VCG, share one goal, namely building as many cars of the order book as possible, on time, with good quality and at the lowest possible cost. VCG continuously promotes this common goal and the norms and values driving the goal in order to convince all JIS suppliers that their contribution to the goal is crucial. The multi-directional communication during STVC meetings contributes to establishing this awareness. Next, the STVC aims at installing joint problem solving with all parties, assisting each other in minimizing operational snags. Also this approach, which requires information sharing of problems, further builds trust based on difficulties that are first shared and then successfully solved. Finally, the STVC workgroup participants jointly work on projects, aiming at problem avoidance, lower operating costs and higher performance. Based on workgroup meetings, several implementation decisions are made jointly.

During these workgroup sessions, VCG and supplier experts share proprietary knowledge, so that all suppliers can be developed. The fact that meeting locations are rotated across all suppliers signals this development goal. In case a workgroup deems appropriate, an outside expert is invited for training.

Concerning the difference between suppliers, it is clear that VCG's trust in batch suppliers can only be built by limited dyadic interaction, because batch suppliers do not participate in STVC meetings. HVA JIS suppliers more frequently attend STVC and STVC workgroup meetings and contribute considerably more than LVA JIS suppliers. VCG managers even confirm that a discussion is going on whether to either always invite all JIS managers or limit participation to those suppliers contributing most and benefiting most from participating. Obviously, this discussion confirms that HVA JIS suppliers not only possess more competencies to share, but also benefit more from workgroup projects, which most adequately builds trust.

Social pressure

Our data show that every supplier is aware of the common inter-organizational goal and is familiar with VCG's norms and values, like openness, fairness, empowerment and collaboration. As a result, VCG and suppliers feel related, like in a team or a clan. Consequently, every supplier faces negative consequences in case of an operational snag, to which he acts opportunistically. Although VCG continues stressing mutual cooperation in both parties' interest, the interacting supplier manager(s) is (are) faced with negative personal feelings, because VCG personally confronts him (them) with mistakes that harm the common goal and do not comply with the norms and values. This social pressure is exercised most on HVA JIS suppliers, as those suppliers are subject to daily operational snags requiring problem solving. LVA JIS suppliers receive less social pressure, while batch suppliers only seldom require VCG interaction for problem solving.

In addition to this bi-directional social pressure, the STVC strengthens VCG's social pressure by bringing all separate MSRs together into one big supplier clan. Clearly, the STVC's main goal is not controlling VCG suppliers. In fact, the STVC is run by suppliers to the benefit of all suppliers and VCG, with maximum support of VCG. Yet, the STVC contributes to social pressure by the fact that important mistakes, depending on the type, are reported on the STVC quality, logistics or IT workgroup meetings, and the most severe ones even at STVC plant manager meetings.

Again, the idea is neither to punish the supplier by providing all details to other suppliers, of which some are competitors, nor to blame some supplier department or supplier manager. The first goal of this collective problem sharing, sometimes even by means of clear pictures, is to learn from mistakes, identify areas of potential amelioration for which workgroup projects could be set up and further stress VCG's open communication. Second, the joint problem sharing builds trust, not only between VCG and the supplier that caused the problem, but between all suppliers, as discussed in the previous paragraph. Last but not least, managers noted that when a supplier snag is reported to all suppliers present at the STVC meeting, the responsible supplier faces negative response of both VCG and all other suppliers. Indeed, because operational snags harm both VCG's and JIS suppliers' production, every supplier needs to give account not only to VCG, but also to all other JIS suppliers. Hence, reporting supplier failures at the STVC offers VCG two means of increasing social control. First, VCG is able to formally structure its bi-directional social pressure. Second, the presence of other JIS suppliers signals the accountability towards all JIS suppliers and augments negative guild feelings in case of supplier failure.[17]

In other words, the STVC creates a clan, in which VCG and JIS suppliers not only look *after* each other, in terms of helping and trying to improve each other, but also look *at* each other, in terms of signalling that the clan does not tolerate mistakes potentially harming the clan without proper action. To that end, social sanctions will be applied by all clan members on defaulting suppliers. We argue that this type of control by the STVC is *social* control in its essence and serves a very important role in VCG's MCS of MSRs. Yet, this importance differs depending on the type of supplier considered. As batch suppliers are no member of the STVC, these suppliers are only subject to dyadic social pressure. Furthermore, HVA JIS supply is more complex, so that the potential negative impact on VCG and other suppliers is larger than the one of LVA JIS supply. Additionally, HVA JIS suppliers tend to attend STVC and STVC workgroup meetings more frequently, which further increases the opportunity of managers to be confronted with mistakes.

[17] A good example of social pressure relates to the monitoring and back-up procedure test of EDI communication, set up by the IT workgroup. First, VCG's IT department drew up an audit questionnaire, which some suppliers did not fill in. Yet, when the following workgroup meeting clearly stated which suppliers filled in the audit form, all non-respondent supplier managers immediately apologised and asked to provide the questionnaire once again. Clearly, no supplier manager likes to be confronted with his name tied to non-compliance, especially not in front of several people involved. The next step in the IT workgroup project involved testing the EDI monitoring and back-up procedure. To heighten the level of supplier priority giving to the test, the IT workgroup dropped anonymity in the report system during meetings. Again, supplier managers responded positively to the social pressure, following from their name being linked to a performance score, which was visible to all other workgroup participants.

Exemplary interview quotes relating to VCG's informal management controls can be found in table 1.4.

Insert Table 1.4 About Here

5 DISCUSSION

The previous analysis confirms the contingency framework's explicative power for VCG's MSRs. Based on the distinction between batch, LVA JIS and HVA JIS suppliers, signalling the situational differences between VCG suppliers, we were able to identify substantial differences in the MCS. These corresponding differences clearly visualize the associations in the framework. Because HVA JIS suppliers are characterized by high performance and relational risk, this supplier type is subject to high outcome and behaviour control. Compared to batch suppliers, this supplier group's outcome is monitored more frequently, responded to more quickly and penalised less stringently. In addition, these suppliers' behaviour is governed by means of an extensive syllabus and weekly company visits. Furthermore, all levels of trust building are highest for HVA JIS suppliers. Finally, the STVC creates generic trust building and social pressure possibilities, which are largest for HVA JIS suppliers. That way, the high levels of risk for this supplier type are governed by the highest levels of both formal and informal control techniques. LVA JIS suppliers are found to be positioned between batch and HVA JIS suppliers on all control systems, which reflects the association of medium governance with medium levels of risk.[18]

Thus, despite having studied MSRs with good operational performance and considerable levels of formal control, we still find high levels of informal control. Apparently, the risk of the more formal MSR, is too high to be governed by primarily formal controls. VCG considerably stimulates trust building and cooperation, because the (potential) costs of unilaterally imposing demands with little trust are considered much higher.

[18] Nevertheless, we acknowledge that small differences remain within each supplier group. These differences might be captured by a continuum interpretation from low to high contingency level, low to high risk and therefore low to high management control structures. By positioning the types of MSRs on these continuums, it becomes clear that a relatively low/high position on the contingency variable continuum corresponds to a relatively low/high position on the MCS continuum. Such continuum interpretation is comparable to recent case based management control findings (e.g. Kamminga & van der Meer-Kooistra, 2007; Sartorius & Kirsten, 2005; van Veen-Dirks; 2006).

In other words, the combined MCS of VCG with substantial levels of both formal and informal control is argued to be designed specifically to improve performance. This does not mean, however, that operational snags do not occur. On the contrary, those problems are daily business, especially in case of HVA JIS suppliers. Yet, VCG believes that dealing with those snags would be more complicated if the OEM would not follow up on suppliers by means of a combined MCS in a cooperative environment.

Consequently, our case findings contradict that MSRs would be governed by little informal control mechanisms (Das & Teng, 2001; Bijlsma-Frankema & Costa, 2005). Moreover, our case strengthens the external validity of case findings on less formal IORs. Indeed, also studies on R&D collaboration (Cooper & Slagmulder, 2004), strategic alliances (Dekker, 2004) and joint ventures (Kamminga & van der Meer-Kooistra, 2007) indicate the importance of informal control usage in inter-organizational MCSs. Furthermore, these studies show considerable evidence of MCS's contingency dependence. In essence, the same two inferences can be made for the MCSs of service outsourcing relations (Langfield-Smith & Smith, 2003; Nicholson et al., 2006; van der Meer-Kooistra & Vosselman, 2000). So, despite theoretical framework differences, our result of a combined MCS that is contingent on situational characteristics corresponds to previous case findings. Even more formal MSRs are governed by a considerable amount of informal control.

In that respect, the most striking finding of this study is certainly the existence and the role of VCG's supplier team in controlling MSRs. In particular, the STVC functions as a clan, which not only structures, and that way strengthens, VCG trust building and social pressure techniques, but also extends this control towards all JIS suppliers. That way, management control on dyadic JIS supplier relations is strengthened by the clan of all JIS suppliers. Yet, this control only follows from the STVC's first goal, which is stimulating and facilitating collaboration among all participants, in order to continuously improve manufacturing processes (i.e. kaizen costing). In that respect, the STVC cooperation is comparable to inter-organizational teams working together on designing new or improved products during the R&D phase of the supply chain, often by means of target costing, which aims at cost reduction through collaboration (Cooper & Slagmulder, 2004). To transpose this collaborative behaviour between mother companies during R&D to facilities during manufacturing, VCG set up the STVC with JIS supplier facilities. In essence, this supplier team structures the unstructured interaction. Compared to formal information exchange, like electronic EDI messages and formal supplier follow-up, informal information sharing largely depends on the personal relationship and willingness of interacting managers.

By means of the STVC, this bi-directional social interaction becomes structured and at the same time multi-directional due to frequent participation of many JIS suppliers. In addition, the STVC offers the possibility to substantially increase informal control on dyadic MSRs. First, the STVC magnifies bi-directional trust between manufacturer and supplier and multidirectional trust among all suppliers. In fact, our study reveals that the forum is a textbook case of building trust by means of several techniques, including networking, frequent information and knowledge sharing, joint decision making and joint problem solving. Second, the STVC clan strengthens VCG's social pressure on suppliers, as supplier errors are discussed during STVC (workgroup) meetings. Obviously, the presence of all suppliers involved increases potential negative feelings with respect to operational snags. So via the STVC, VCG succeeds in structuring unstructured social *interaction*, and by doing so, transforming it into social *control*.

Nevertheless, it must be emphasized that the social control technique of the STVC would not work without the willingness of all suppliers to open up their facilities during supplier visits and share both technical and managerial knowledge. Hence, the information exchange exceeds mere cost information, as discussed in studies of open-book accounting during commercial negotiations (Seal et al., 1999) and R&D (Kajüter & Kulmala, 2005), to include all kinds of information concerning manufacturing and delivery processes, as exemplified by the case study of Mouritsen, Hansen & Hansen (2001).[19] Furthermore, STVC interaction offers participants the opportunity to get to know each other personally regarding family situation and/or personal interests. In a setting in which cooperation based on mutual trust[20] is considered crucial and built through personal interaction, this last form of information exchange is indispensable to jointly operate in JIS and already avoided numerous line stops.

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[19] One important remark concerning the STVC is the fact that trust building and collaboration among VCG suppliers is not as evident as between VCG and particular suppliers, because some supplier facilities are *competitors* on mother company level. For example, VCG has different suppliers for car seats and cabling. Yet, the cabling supplier delivers car seats to other OEMs and could definitely supply car seats to VCG as well. This situation negatively impacts facility managers' willingness or permission to open up factories and share proprietary knowledge. Nevertheless, the STVC overcomes this barrier by arguing that although suppliers are competitors in the global market place, their competitiveness only plays during commercial negotiations, which are concluded well before the start of manufacturing. Indeed, during the manufacturing phase, all suppliers serve the same purpose regarding their product, namely supplying the right product, on time, with good quality and at the lowest possible cost. By considering this common goal and allowing suppliers to hold back certain production infrastructure or process knowledge which is patented, the STVC finds most suppliers prepared to *trust and collaborate with competitors*.

[20] Concerning the question whether trust primarily exists between people or organizations (cf Tomkins, 2001), our case data contain considerable evidence of inter-personal trust. This compares to similar evidence of Dekker (2004) and Cooper & Slagmulder (2004).

So, although the STVC advantages are not always directly measurable in monetary terms, all participating members are convinced that these benefits play an important role in VCG's and JIS suppliers' performance, because better delivery disturbs VCG's manufacturing less.

To end this discussion, we compare VCG's STVC with the approach of Toyota (cf Dyer & Nobeoka, 2000). In order to increase the knowledge base and lower the knowledge sharing cost, Toyota actively shapes a network identity with its suppliers by means of shared values and goals, and mechanisms such as a supplier association and small group learning teams, which resemble VCG's STVC. Nevertheless, we believe VCG considerably differs from Toyota, in particular concerning the degree to which suppliers are compelled to collaborate and adopt the Toyota production system (TPS). Indeed, Toyota admits that if a supplier would be unwilling to open up operations to other firms in the network, the refusal would be a serious breach of faith, jeopardizing future collaboration with the supplier (Dyer & Nobeoka, 2000). Additionally, Toyota appears much more interested in transferring Toyota knowledge to suppliers than learning from suppliers, which results in the obligation for suppliers to work with their systems. Therefore, we argue that Toyota sets up appropriate mechanisms to create a network identity, but with little respect for supplier identity or particular supplier knowledge. VCG, however, considers it essential not to push collaboration, but to strive at unmediated cooperation between JIS suppliers. For example, VCG does not compel supplier participation at STVC meetings, but allows supplier (plant) managers to freely decide on their presence. Additionally, VCG does not demand suppliers to comply with their way of manufacturing, but stimulates them to transfer their expertise to VCG as well. VCG always helps suppliers as partners and by mutual agreement, if necessary on a daily basis. Only when problems keep dragging, VCG uses its commercial power advantage to speed up a solution. By means of the STVC and its collaboration, VCG expresses respect for supplier company culture, supplier responsibilities and supplier expertise, while installing one common clan culture that surpasses company boundaries.

6 CONCLUSION

This paper contributes to the inter-organizational management control literature by illustrating how manufacturers design the MCS of supplier relations in the manufacturing phase of the supply chain. Although MSRs offer important cost reduction possibilities, which require appropriate management controls (Carr & Ng, 1995; Cooper & Slagmulder, 1999), these control techniques lack sufficient academic knowledge (Cooper & Slagmulder, 2004; Langfield-Smith & Smith, 2003; Scannell et al., 2000). Therefore, we investigate supplier MCS design in one of the most competitive manufacturing industries in the world, namely automotive. Especially this industry is considered to be trend-setting in the search for continuous improvement, which is exemplified by the rise of lean manufacturing and lean supply (cf Womack et al., 1990) and kaizen costing (e.g. Carr & Ng, 1995).

Research on procurement and R&D found that other types of IORs, like R&D collaboration (Cooper & Slagmulder, 2004), strategic alliances (Dekker, 2004) and joint ventures (Kamminga & van der Meer-Kooistra, 2007) are governed by a combination of formal and informal control. Based on these findings' external validity, MSRs could be expected to be governed by a combination of formal and informal control as well. However, as MSRs are more formal than those IORs, MSRs could be expected to be governed by primarily formal controls with little informal controls (Das & Teng, 2001; Bijlsma-Frankema & Costa, 2005). Hence, the literature offers different MCS designs for MSRs, either a combined MCS or one consisting of primarily formal controls, which motivates studying the MCS design of MSRs and the importance of informal controls in that design. Since automotive practice shows evidence of high and low levels of informal control as well, our first contribution is answering how the MCS of automotive MSRs is designed. Yet, besides illustrating that MCS design, this paper also contributes to explaining the MCS design, because evidence on contingency theory's explicative power in MSRs is rather limited (Cooper & Slagmulder, 2004; Langfield-Smith & Smith, 2003; van der Meer-Kooistra & Vosselman, 2006). To that end, we propose a refined theoretical contingency framework based on recent inter-organizational management control theory, but specifically adapted for the manufacturing phase.

In order to illustrate the validity of this framework in practice, we performed an in-depth case study of the supplier MCS of Volvo Cars Gent. Our semi-structured interviews and archival data contain substantial evidence of the proposed associations and indicate that informal controls are very important in manufacturing.

The identification of three supplier types, namely batch, LVA JIS and HVA JIS suppliers, characterized by different levels of antecedents and risks, visualizes the association with the management controls tuned to govern the risks. For example, as HVA JIS suppliers score relatively high on all contingencies and subsequently on both performance and relational risk, VCG designed the MCS accordingly, with high levels of outcome and behaviour controls. Yet, besides these formal controls, VCG pays considerable attention to informal control, more specifically to different kinds of trust building techniques and social pressure. In that respect, the most striking finding of this paper is the existence and the role of VCG's structured supplier team in controlling MSRs. In fact, the STVC functions as a clan, which not only structures, and that way strengthens, VCG's trust building and social pressure, but also extends this control towards all JIS suppliers. That way, management control on dyadic JIS supplier relations is strengthened by the clan of all JIS suppliers. This combined MCS is designed specifically to improve performance, which corresponds to earlier inter-organizational management control research (e.g. Anderson & Dekker, 2005). As our theoretical model drew on findings from other less formal IORs, our case not only offers more evidence of those findings' external validity, but also confirms that MSRs are governed depending on situational characteristics. By studying an under-explored part of the supply chain, for which the inter-organizational management control literature proposes different supplier MCS designs, this paper contributes to this increasingly growing literature by reducing a perceived gap between literature and management practice, as called for by Nixon & Burns (2005).

Naturally, our findings have some important implications. The case findings support the importance of a combined MCS, suited for the contingencies of the MSR under investigation, which corresponds to recent studies emphasizing the *extended* make-or-buy decision (Cooper & Slagmulder, 2004; Gietzmann, 1996; van der Meer-Kooistra & Vosselman, 2000).[21] Although supplier relations, especially in automotive, seem to become more demanding once the manufacturing supply chain phase starts, VCG clearly holds on to cooperative interaction, comparable to the procurement and R&D phase. Instead of lowering collaboration and informal controls in favour of a more demanding approach with more formal controls, VCG balances formal and informal controls and highly values the role of trust building and social pressure.

[21] The *extended* make-or-buy decision not only deals with the decision to make or buy, but also with partner choice and MCS design. Our findings indicate that VCG actively considers this *extension* by designing its MCS to support specific MSRs.

The central role of the STVC strengthens this finding. Consequently, managers should be aware of the benefits of well designed MCSs in MSRs, especially in a very competitive business environment like automotive.

Nevertheless, these implications are hampered by an important limitation due to the case research. By only looking at one specific industry and exclusively studying one type of IORs of one automotive OEM, we aimed at maximizing comparison opportunities and minimizing extraneous variation within the case. Yet at the same time, we limited generalizability outside this context. For example, it remains unclear to what extent VCG's company culture determines the use of informal controls compared to other (automotive) organizations. Similarly, the impact of prior supply chain phases and mother company influences on VCG's MSRs remain unaddressed. However, these limitations offer a first avenue for further research. To investigate the external validity of our findings, research could be done on other MSRs, both in automotive and in other industries, like consumer electronics. Especially the occurrence and usage of STVC-like fora in MSRs are worth further investigation, because they seem to offer considerable benefits. To that end, other case studies or a comprehensive survey could be set up.

A second research direction follows from the assumption in our theoretical sampling that VCG's MCS benefits performance. Although this presupposition was confirmed by interviewees, we never really investigated it. Hence, a follow-up study could investigate to what extent the contingency fit between antecedents and management controls, as proposed by the framework, contributes to operational performance (Kamminga & van der Meer-Kooistra, 2007; van Veen-Dirks, 2006). In other words, what would be the negative consequence of a contingency misfit?[22] Yet, in order to effectively study this research question, a longitudinal research design is needed, preferably of changing supplier relations.

[22] Since that kind of MCS misfit over time would result in escalating control problems, damaging the MSR performance (Dekker, 2004), such misfitted MCSs would be changed towards a more suitable design (van Veen-Dirks, 2006). So, assuming that MCS dynamics are equilibrating and return to a stable situation after being disturbed (van Veen-Dirks, 2006), the appropriate research question is to what extent a *temporary* contingency misfit *temporarily* negatively influences operational performance.

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APPENDIX: INTERVIEW PROTOCOL (MAIN QUESTIONS + EXEMPLARY PROBES FOR DETAIL)

Q1. Could you sketch the outsourcing relation between the supplier and VCG?

- When did the relationship start and why did VCG outsource the manufacturing of this product?
- What are the characteristics of the product and its production process?
- What is your function in the company and your role in the VCG-supplier relation?
- With which departments of the supplier/VCG do you most frequently interact?

Q2. How does VCG control the relationship with the supplier?

- Which KPIs for quality, logistics, etc. are set up? Which of them are the most important? How frequently are they followed up on? Are there KPI targets? How does VCG penalize the supplier in case of operational problems or performance below target? Are those penalties negotiable?
- Which procedures, rules, regulations, etc. does VCG put in place to monitor and control supplier behaviour? How frequently is behaviour followed up on? Does VCG visit the supplier?
- Are there other control mechanisms present in the VCG-supplier relation?
- Are there, in that respect, differences with other suppliers?

Q3. How does cooperation between the supplier and VCG work out?

- Is there a difference between cooperation in case of difficulties and cooperation as part of continuous improvement?
- To what extent is information shared in the VCG-supplier relation? Does information sharing occur via personal interaction and/or via the supplier team?

Q4. What is the goal of the supplier team and what are its benefits, if any?

- How big is the supplier's contribution to the supplier team and how big are the benefits from the supplier team for the supplier?
- Are there, in that respect, differences with other JIS suppliers?

Q5. What does trust mean for you (in an inter-organizational context)?

- How would you evaluate that trust in the VCG-supplier relation?
- Is trust important?
- How is trust built?

Q6. Could I look into some relevant documents (e.g. reports, meeting minutes, PP-presentations, contracts, etc.)?

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FIGURE 1.1:

Theoretical contingency framework for MCS design of MSRs

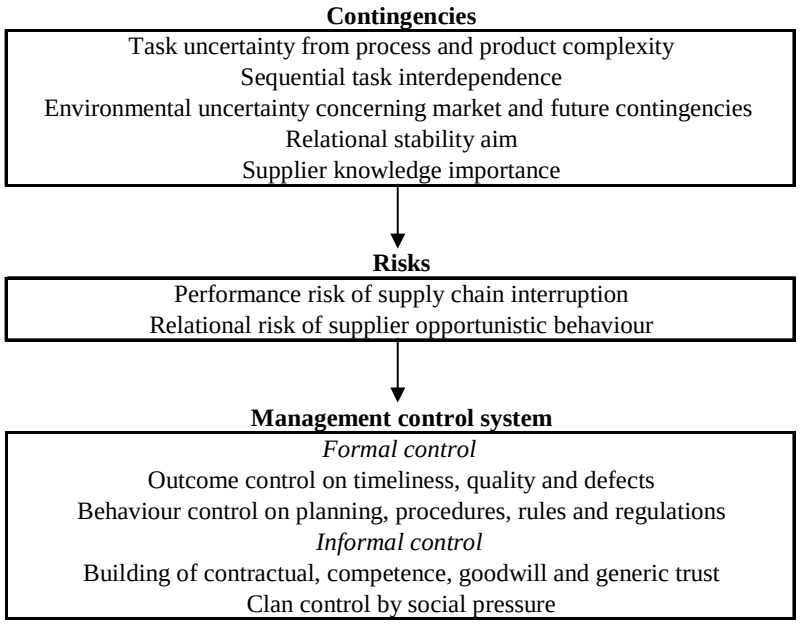

TABLE 1.1

Interview data summary

Organization	Interviewee	Number of interviews	Duration (in min.)	Date
VCG	Engineering Director & Material Planning & Logistics Manager	1 (joint)	122	8/02/2006
	Supply Chain Control & Coordination Manager	3	55; 62; 58	10/02/2006; 29/05/2006; 13/10/2006
	Logistic Engineering Manager	1	68	10/02/2006
	Supplier Support & Purchasing Manager	3	92; 95; 98	15/02/2006; 18/04/2006; 29/05/2006
	Material Planning Manager	1	73	15/02/2006
	Supplier Quality Assurance Manager	3	44; 96; 67	15/02/2006; 29/05/2006; 13/10/2006
	Human Resource Manager	1	50	15/02/2006
	Finance Manager	1	47	15/02/2006
	IT Manager	1	67	13/03/2006
HVA JIS (1)	Plant Manager	2	106; 74	13/03/2006; 18/04/2006
	Human Resource Manager	1	51	29/03/2006
	Quality Manager	1	125	29/03/2006
HVA JIS (2)	Plant Manager	1	164	30/03/2006
HVA JIS (3)	Plant Manager	1	102	3/05/2006
HVA JIS (4)	Plant Manager	1	116	10/10/2006
LVA JIS (1)	Plant Manager	1	68	24/05/2006
LVA JIS (2)	Plant Manager	1	121	6/10/2006
Batch (1)	Commercial Service & Quality Manager	1	61	27/09/2006
Batch (2)	Customer Service Manager & VCG Account Manager	1 (joint)	73	27/10/2006

FIGURE 1.2

MCS design of MSRs at VCG

	Suppliers		
	Batch	**LVA JIS**	**HVA JIS**
Contingencies			
Process complexity	batch	low value-added just-in-sequence	high value-added just-in-sequence
Product complexity	standard components	customized components	customized modules
Performance dependence	partially	entirely	entirely
Flexibility requirements	low	high	high
Process knowledge asymmetry	depends	low	high
Supplier dependence on fluctuating demand	partially	entirely	entirely
Impact of unknown future contingencies	low	high	high
Relational stability aim	medium	high	very high
Supplier knowledge importance	little supplier knowledge	good plant manager knowledge	good plant manager and middle manager knowledge
Risks			
Performance risk of supply chain interruption	low	medium	high
Relational risk of supplier opportunistic behaviour	low	medium	high
Management control system			
Outcome control			
Quality KPIs	PPM	PPM; audit remarks	PPM; audit remarks
Logistics KPIs	MPs; line stop minutes; dropped cars; delivery precision	MPs; line stop minutes; dropped cars	MPs; line stop minutes; dropped cars
Specific audit remark targets	no	no	yes
Quality off-target response time	no response, unless severe snag	daily	daily
Logistics off-target response time	depending on stock level	daily	daily
Quality KPI follow-up	no response, unless severe snag	monthly	monthly
Logistics KPI follow-up	daily	daily	daily
Technical quality report penalty	predefined; non-negotiable	none	none
Line stop penalty	predefined; non-negotiable	tailor made; negotiable	tailor made; negotiable
Behaviour control			
Syllabus	none	basic routines	basic routines; specialized extensions
Supplier quality follow-up	none, unless severe snag	weekly, unless snag	daily
Supplier logistics follow-up (workload score)	2, 5 or 10	2 or 5	10
Supplier company visits	none, unless severe snag	monthly	weekly
Open information sharing	none	limited	extensive
Trust building			
Specific trust building			
Contractual trust building	high	high	high
Competence trust building	medium	high	very high
Goodwill trust building	medium	high	very high
Generic trust building via STVC			
Global STVC / STVC workgroup attendance	no member	52% / 43%	69% / 68%
STVC workgroup contribution	no member	low to medium	high
Social pressure			
Supplier interaction for problem solving	seldom	often	daily
Global STVC / STVC workgroup attendance	no member	52% / 43%	69% / 68%

TABLE 1.2

Exemplary interview quotes concerning VCG's MSR contingencies and risks

Theoretical variables	Interview Quotes (Source)
Contingencies	
Process complexity	Sometimes, both groups of suppliers [LVA and HVA JIS] are called in the same breath, but actually one should not do that. A supplier that only puts parts in the right order is incomparable to a supplier with a much more complex process that assembles all sorts of parts in the right way. (HVA JIS supplier)
Product complexity	Subsequently, there is a further partition on the basis of the product. Those suppliers that really deliver a serious added value also have a process in which all sorts of things can go wrong, and are distinguishable from suppliers that add less value to the product and also possess almost no production process in Gent. (VCG)
Performance dependence	If Volvo is stopped for two hours or for an entire shift, no batch supplier suffers from that. All call-offs are send as usual. JIS suppliers, however, are stopped as well. (VCG)
Flexibility requirements	The STVC is set up with JIS suppliers around Volvo that are very sensitive to changes. A day of economic unemployment, one minute stoppage of the assembly line or one overtime hour at Volvo has consequences for the production at those suppliers. (VCG)
Process knowledge asymmetry	Volvo has transferred her [HVA JIS product] knowledge to our [HVA JIS supplier] employees step by step, until the point when our people had more experience than the people of Volvo. (HVA JIS supplier)
Supplier dependence on fluctuating demand	There is a total excess capacity of cars, as a result of which manufacturers are much more flexible towards the market. When the market demands something else than planned, they will listen to it. As a result, the capacity planning compared to the real orders is suddenly completely wrong, so that other amounts of components are needed, which suppliers completely did not expect. (VCG)
Impact of unknown future contingencies	In principle, JIS suppliers are certain about their contract for the life time of the current product. They are never certain about the next model. […] Volvo must fight as well and be the best to get the new [car] model to Gent. […] It is possible that the current supplier loses the battle and is switched. Everything is possible. The supplier must continuously prove being worth JIS supplier of Volvo. […] Also Volvo must continuously work and prove to be the best. The same holds for the suppliers. (VCG)
Relational stability aim	We do not want to change suppliers, because then we must completely start over the relationship with the supplier, which costs much time and thus money. […] In case of a problem, the supplier is first helped and not immediately subject for replacement. Only when the supplier is really of ill will or really unable or unauthorized to solve the problem, we go to the market. (VCG)
Supplier knowledge importance	We [HVA JIS supplier] have the advantage to be built up with people coming from the Volvo organization. Those employees know plenty of people at Volvo. […] On all levels, also team leaders on the shop floor, people communicate very informally. (HVA JIS supplier)
Risks	
Performance risk	In a [HVA] JIS environment, with two thousand parts coming from Japan, Mexico, China and everywhere in Europe, one can expect problems. The typical problems are quality issues and machine breakages. (HVA JIS supplier)
Relational risk	The suppliers brought all hands on deck in the hope of solving the problem in time, without the customer feeling a thing. The suppliers took a risk and if they succeeded, it was ok. If not, we stopped or received bad products. (VCG)

TABLE 1.3

Exemplary interview quotes concerning VCG's formal management controls

Theoretical variables	Interview Quotes (Source)
Outcome control	
Quality KPIs	The most important KPIs for quality are PPM and external audit remarks. Yet, the latter KPI is not monitored for batch suppliers. (VCG)
Logistics KPIs	I use three formal KPIs: missing parts, line stop minutes and service level or delivery precision, of which the first two are the most important and followed up for both batch and JIS suppliers. The latter is only monitored for batch suppliers. […] The list of reports also contains dropped car reports. (VCG)
Specific audit remark targets	Concerning audit remarks, specific audit remark targets are only set for high impact high value-added suppliers, which are followed up in an Excel file. (VCG)
Quality off-target response time	Surely, I will respond faster for high value-added suppliers than low value-added suppliers, when a negative trend arises. I notice that because of the relation that we have with the supplier and the daily cooperation. (VCG)
Logistics off-target response time	For JIS suppliers, we play the ball shortly, because we do not have stock for those suppliers' products. For batch suppliers, there usually is stock for one and a half to two weeks. Only when the stock level drops and the [batch] supplier is unable to deliver, we respond. (VCG)
Quality KPI follow-up	Every month, a 4Q report arrives in my mailbox from all JIS suppliers. (VCG)
Logistics KPI follow-up	We run daily queries for delivery precision, which are send to the suppliers via e-mail. Also line stoppages and the number of dropped cars are monitored daily. Finally, the number of missing parts is automatically sent as a report to the supply chain controllers every 24 hours. That approach is the same for all suppliers. (VCG)
Technical quality report penalty	Concerning technical reports, suppliers of sequential parts are not charged for a technical failure. In case of batch suppliers, four man hours are always charged. (VCG)
Line stop penalty	Big line stoppages are always discussed with the supplier and billed depending on the situation. […] Whether invoices for line stoppages are actually send, is a tailor made decision. That's why my department keeps those data. When it concerns a once-only incident at a certain supplier, Volvo has to be realistic. However, when the line stoppages are continuously and latently present in the data, it becomes another story. […] Batch suppliers are treated stricter than JIS suppliers with respect to penalties. The fact that Volvo can cause stoppage at JIS suppliers as well plays a part in the assessment of sending penalties. (VCG)
Behaviour control	
Syllabus	The syllabus is the golden handbook, with a mutual fine-tuning of procedures and what to do in case of problems. […] The syllabus is not part of the target agreement, but has to be fine-tuned and is therefore considered to be a binding agreement. (VCG)
Supplier quality follow-up	For batch suppliers, there is no supplier follow-up, unless there is a large problem, which does not get solved. […] We are continuously working on high value-added JIS suppliers, every day. Also with low value-added JIS suppliers, we are very busy; but less and only when something comes up. […] When nothing goes wrong, we let those suppliers do as they please. (VCG)
Supplier logistics follow-up	My department uses a point system in which every supplier receives two, five or ten points, depending on the work load for the controller. […] [HVA] JIS suppliers with a heavy process and high added value always get ten points, because we know that we experience difficulties with them once every while. (VCG)

Supplier company visits	My controllers only visit suppliers when there are problems and that is more often the case with larger [HVA] JIS suppliers than with [LVA] suppliers that only sequence. I guess that about once a week somebody visits those [HVA JIS] suppliers, while pure sequential [LVA JIS] suppliers are never visited more than once a month. (VCG)
Open information sharing	Apart from the electronic data, Volvo has asked the [HVA JIS] supplier permission to visit the shop floor regarding the difficulties. There, Volvo has looked at the working instructions of the operators. […] Next to that, also control instructions were inspected. […] Also the follow-up of how many good and bad parts every shift produced was investigated. (VCG)
	Openness and whole-hearted talking to each other is not easy, but I still try to cultivate it within the STVC. I want suppliers to be open and to learn from each other, without them thinking of the competitiveness at higher levels in their companies. […] This attitude is reflected in the slogan of the STVC: "Dare to Share!". […] In the forum for quality managers, I try to be as open as possible and share general information concerning Volvo as much as possible. […] By being open myself, I receive much openness and information back from the supplier. (VCG)

TABLE 1.4

Exemplary interview quotes concerning VCG's informal management controls

Theoretical variables	**Interview Quotes (Source)**
Trust building	
Specific trust Building	
Contractual trust Building	I want the plant manager to call for help and to simply tell me if he can not promise something. I do not want promises, which can not be kept, because Volvo can not do anything with those promises. Volvo prefers the supplier to openly and honestly inform Volvo that they experience a problem, which they can not solve for the time being. […] Promising that it [the problem] is solved tomorrow and not keeping that promise, is something a supplier can not do often. That can happen once and then I point out that it does not work that way. The second time, that leads to relational problems. I prefer the supplier to say: "I can not do it". (VCG)
	For me, trust means "a word is a word". For me, little has to be put on paper. When somebody promises me something or I promise something to somebody, I assume that it happens. […] With Volvo, that works perfectly. Relations are built up and that is not possible with everybody. When someone new starts at Volvo, that person does not have that bond with the suppliers. That has to be built up with people. (batch supplier)
Competence trust Building	I want to send out trust to Volvo that we deal with the problems and solve them in reasonably short term. [...] Trust needs time to be built up anyhow. One does not have trust immediately. Besides, trust is not built by what you say, but by what you do. The results have to be there. (HVA JIS supplier)
	The personal relationships with Volvo are rather good, because our plant is located very near by Volvo and lots of our co-workers came from Volvo. […] I believe that [the relationship] works pretty well with all suppliers, although it might work slightly better with our co-workers, because they are all ex Volvo people. (HVA JIS supplier)
Goodwill trust Building	I admit that I do not call Volvo and admit to having a problem for every hick-up in our [HVA JIS] process, because then I can call them every day. Every day, there are problems in a company. The trust has to be there that, when the problem is serious and we see "now, it will go wrong", we provide the right information on time, so before the process actually goes wrong. (HVA JIS supplier)
	Being honest towards each other and not covering up problems works best. […] By working in beforehand, certain things can be taken into consideration. This approach is constantly promoted by Volvo and me. […] That honesty towards each other is a consequence of respect for each other. That respect has to be earned and can not be claimed; not even by the customer. Respect is mutual trust that rises from many years of cooperation, experience with open and less open managers and talking about one thing and another. (VCG)
	Trust is built across time by good cooperation and not dropping each other, both externally and internally, in case of problems. Then, one must always be open and honest. In case of problems, it depends on how you deal with those problems whether trust gets damaged or strengthened. (LVA JIS supplier)

Generic trust building via STVC	
Global STVC / STVC workgroup Attendance	Socializing is a very important aspect of the STVC meetings. Because of that, every meeting starts with a joint lunch, to have loose chats about every possible subject. […] The most important reason to work on socializing is that suppliers need a strong bond and lots of trust towards each other. That is necessary in a JIS environment, because if one supplier stops, for example because of a stock out or machine breakage, not only that supplier suffers, but also Volvo and the other JIS suppliers. When the entire settlement of that issue has to be done via the management, parties will kill each other. The whole reasoning of "There was a stoppage of that long, for which that supplier is to blame, so he has to pay that high of a penalty" only leads to bigger problems. […] Socializing is important in creating trust that works across company boundaries. That way, one can cooperate with a neighbour in case of problems. On the other hand, the STVC also provides the opportunity to talk with people and exchange ideas, before a problem arises. (HVA JIS supplier)
	I promote the STVC with an open communication, where suppliers sit together as a team and try to help each other. (VCG)
	Volvo is the binding agent of the suppliers, because all suppliers have one common goal, which is supplying Volvo. (HVA JIS supplier)
	The attendance rate is an indication of who attaches most importance to participating in the STVC. The time a manager makes for the meeting is an indication of the importance he attaches to the meeting, because time is something neither one of us has. (HVA JIS supplier)
STVC workgroup Contribution	Concerning the contribution relating to logistics and quality, the bigger [HVA JIS] suppliers offer a larger contribution to the STVC and the work groups. […] Based on the situational circumstances, there is more or less input and contribution to the STVC meetings. Some suppliers even do not participate at all. (LVA JIS supplier)
Social pressure	
Supplier interaction for problem solving	I am proponent of the approach in which we work with the customer on a problem till 8pm, then have dinner and a drink together, sometimes till the early hours, and continue cooperation the next morning. That cooperation leads to a team spirit, in light of which the customer does not tell the supplier that he produces and therefore has to solve the problem, and the supplier does not tell the customer that he developed problems and therefore is responsible for dealing with them. On the contrary, the question is how both parties can solve the problem jointly. (HVA JIS supplier)
Global STVC / STVC workgroup Attendance	Moreover, there is the STVC, which exercises social control on the suppliers. That is, in the STVC the performance of every supplier is shown. And nobody likes to be offended as worst performer. That stimulates and motivates even more. Although the suppliers obviously differ and therefore can not be compared just like that, the worst performer gets seriously offended, especially when he stops Volvo and that way also the other [JIS] suppliers. At that moment, there are nineteen people across the table saying: "What the hell is wrong with that supplier?", because they get in as much trouble as Volvo. (HVA JIS supplier)
	Concerning IT, we have experienced intense moments, in which an IT problem at a supplier stopped Volvo and the JIS suppliers, including us [HVA JIS supplier]. Through the STVC, which serves common interests, that supplier was asked to let his systems be checked. (HVA JIS supplier)