

# The influence of an initial public offering on the management control system of an innovation organization

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An exploratory case study in a medical devices firm

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## Abstract:

This thesis explores whether the management control system (MCS) of an innovation firm is influenced by an initial public offering (IPO). In academic literature, effective management control in an innovation firm has traditionally entailed less formalization and greater employee autonomy. However, an innovation firm is often required to go public to acquire the capital needed to sustain continued research and business development; a significant change commonly associated with increased formalization, bureaucracy and decreased management flexibility. These seemingly contradictory demands have been increasingly challenged in contemporary studies; additionally, whereas MCS and innovation has been the subject of extensive academic research, very few studies have examined MCS in post-IPO companies. This exploratory study merges these topics by adapting Hales' framework for MCS and comparing our theoretical propositions with case study data from a recently listed innovation firm. In terms of focus of control, input, process and value control are proposed being positively associated with innovation but not influenced by an IPO, whereas output control is neither associated with innovation nor influenced by an IPO. All styles of control, except informal, were positively associated with innovation, with formal and external control being influenced by an IPO. The empirical findings largely support our propositions, providing a solid starting point for future research within this integrated area.

**Supervisor:** Peter Jönsson

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**Key words:** Management control systems, MCS, initial public offerings, IPO, innovation

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# 1 Introduction

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## 1.1 Background

In order to achieve long-term survival and success, an organization typically needs not only clear objectives and strategies, but also the means to implement them. Whereas strategy control is primarily externally focused, management control is internally focused on what managers can do to ensure a successful implementation of these objectives and strategies.<sup>1</sup> The optimal management control system (MCS) for each organization varies depending on both external and internal factors, as well as significant changes in these factors.

Innovation is arguably one of the most vital aspects for a firm's long-term productivity and growth,<sup>2</sup> making the influence of MCS on innovation one of the most interesting areas of research. A high-tech start-up with a high rate of innovation needs creative employees, and researchers have traditionally associated successful innovation processes with more informal MCS<sup>3</sup> and greater individual autonomy for employees.<sup>4</sup> However, more recent research findings challenge this,<sup>5</sup> suggesting increased formalization in MCS to actually be beneficial for, alternatively not significantly affect, innovative activities.<sup>6</sup>

For the innovative firm, acquiring the capital needed to sustain continued innovation in form of research and development (R&D) often requires the firm to go public, a significant change that affects all aspects of the firm.<sup>7</sup> After the initial public offering (IPO), internal organizational changes to the financial accounting and reporting systems, investor relations, incentive programs and board compositions are often needed to meet new regulations and obligations. This, together with fast company-size growth post-IPO,<sup>8</sup> is often viewed as entailing increased formality, bureaucracy and decreased management flexibility. Thus, the restructuring events that are critical to continued innovation may subsequently shape the very innovative activities they are funding by creating interdependence between financing and innovation, potentially restricting innovation.<sup>9</sup>

In the traditional view, the demands on the optimal MCS for innovation firms and post-IPO firms, respectively, are seemingly irreconcilable. However, the prevailing paradigm for the optimal MCS design for innovation is increasingly challenged. In addition, whereas MCS and innovation has been the subject of much academic research, there are very few studies directly

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<sup>1</sup> Merchant & Van der Stede, 2003.

<sup>2</sup> Cho & Pucik, 2005.

<sup>3</sup> Ouchi, 1979.

<sup>4</sup> Amabile, 1998.

<sup>5</sup> Poskela, 2009.

<sup>6</sup> Poskela, 2009.

<sup>7</sup> Wu, 2006.

<sup>8</sup> Carpenter & Petersen, 2002.

<sup>9</sup> Wu, 2006.

examining the topic of MCS in post-IPO companies. Collectively, these two research topics pose both presumably contradicting and to date much unexplored questions, and calls for further exploration of their interactions and interdependencies.

## 1.2 Objective, purpose and contribution

This thesis aims to explore the overlapping area between innovation, IPOs and MCS. Given the current development of these research topics, this thesis will have a general focus on MCS in innovation firms and the possible effects of an IPO on these systems. In other words, the objective is to explore:

### **Is the management control system of an innovative firm influenced by an initial public offering?**

As mentioned before, there exists a large body of literature on MCS frameworks as well as MCS frameworks and innovation. However, to our knowledge, there are no frameworks on MCS changes post-IPO, only studies pertaining to i.e. effects on MCS in strategic buyouts<sup>10</sup> and in mergers and acquisitions.<sup>11</sup> Only one study aims to analyze the differences between management processes in private and publicly listed companies.<sup>12</sup> Therefore, this thesis aims to contribute to the existing literature both theoretically and qualitatively. The purpose of this is thus twofold: *first*, existing theoretical frameworks are examined and adapted into an appropriate framework for analyzing MCS changes in an innovation firm after an IPO. *Second*, the adapted framework is compared to empirical studies of an innovation firm. The aim is to provide a general overview of this largely unexplored topic and a solid starting point for future research.

Given the objective and purposes, the following research questions should be answered:

- **How can we identify and substantiate the key concepts MCS, innovation and IPOs?**  
*Find out through extensive literature search and review.*
- **What are the characteristics of MCS in an innovation firm?**  
*Find out through literature review and analysis, and compare with empirical data from a case study of an innovation firm in the medical devices industry.*
- **How does an IPO influence these MCS? Does it indeed bring increased formalization as generally presumed?**  
*Find out through literature review and analysis compared with the empirical data obtained from case study.*

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<sup>10</sup> Bruining et al., 2004.

<sup>11</sup> Nilsson, 2002.

<sup>12</sup> Trostel & Nichols, 1982.

### 1.3 Delimitations

This exploratory study focuses on the interplay between MCS, innovation and an IPO process in a general context, and should be viewed as an introductory analysis of the topic and a foundation for future research. The different facets of an innovation process will not be analyzed in detail, nor related research areas such as innovation management and culture, new product development, strategy management, organizational change, firm ownership changes, agency costs or accounting-based control systems. Additionally, the exploratory nature of this thesis permits general propositions and tentative conclusions, excluding any explanatory or causal findings.

### 1.4 Disposition

The disposition of this thesis is as follows:

1. The **Introduction** section provides a background of the topic and the study's research scope.
2. The **Method** section gives an overview of our research process and selection of case study subject, providing an outline of the literature research and data collection.
3. The **Theory** section is divided into four sections. The first section introduces, defines and conceptualizes innovation and IPOs to underpin the subsequent study. The second section gives an overview of the existing body of management control theory and frameworks. The third section presents the functional MCS framework used as a foundation for the adapted framework. The fourth and final section presents the adapted framework for studying MCS in innovation companies after an IPO, using a series of propositions.
4. The **Empirics** section describes the empirical findings from our case study, adhering to the disposition of the adapted framework for increased clarity.
5. The **Discussion** section compares and contrasts the empirical findings with the theoretical outline, reaching tentative conclusions to the propositions presented in the adapted framework.
6. The **Concluding remarks** section reflects upon the validity and reliability of our conclusions and their future implications in this research field. Finally, we summarize our findings and address the objective of this thesis.

## 2 Method

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### 2.1 Choice of method

Our objective is to investigate whether MCS in innovation firms are influenced by IPOs. Given the exploratory nature of our objective, Holme and Solvang recommend a qualitative scientific approach as opposed to a quantitative one.<sup>13</sup> Although some claim<sup>14</sup> that inductive research designs - e.g. grounded theory - are the most commonly applied in qualitative studies, this is challenged by i.e. Silverman,<sup>15</sup> who argues for deductive approaches being equally suitable. Bearing this in mind, a hypothetical-deductive approach<sup>16</sup> is applied in this thesis, primarily due to our two-fold purpose of exploring the conflicting theories in our research area as well as empirically testing them (as discussed in further detail below).

According to Yin,<sup>17</sup> the “how” nature of our research question is best answered through experiments, histories and case studies. Since we will examine contemporary events without manipulating or controlling behaviors, Yin recommends using case studies. A *case study* is defined as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. Because of this, the data collection of the inquiry needs to cope with there being more variables of interest than data points, relying on triangulating multiple sources of evidence and prior development of theoretical propositions to guide both the data collection and the analysis.

### 2.2 Case study research and theory

Unlike related research methods such as i.e. grounded theory,<sup>18</sup> theory development is essential prior to data collection in a case study.<sup>19</sup> Furthermore, it is also the foundation of the level at which the generalization of the case study results will later occur (see Figure 1). A clear theory development enables a case study analysis to reach the second inference level, which is why we aim to select an MCS framework that can be adapted to include contrasting theories, thus broadening the scope of generalization. Due to the importance of the theory development for this thesis’ objective and purposes, an extensive literature study of books and articles is the first step and the foundation for the subsequent data collection and analysis.

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<sup>13</sup> Holme & Solvang, 1997.

<sup>14</sup> See e.g. Bryman, 2002.

<sup>15</sup> See e.g. Silverman, 2000.

<sup>16</sup> Thurén, 2007 and Holme & Solvang, 1997.

<sup>17</sup> Yin, 2003.

<sup>18</sup> Strauss & Corbin, 2008. se bibl

<sup>19</sup> Yin, 2003.

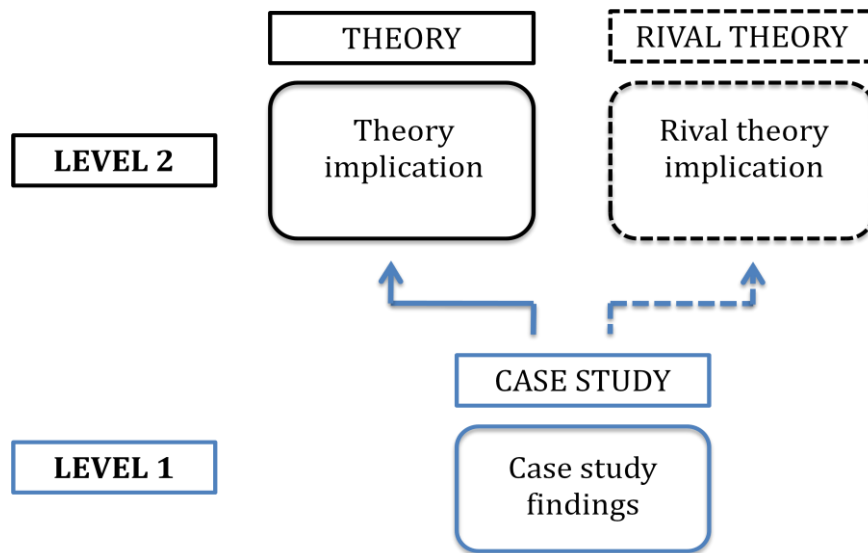


Figure 1. Two different inference levels. Adapted from Yin (2003).

### 2.3 Case study design

According to Yin, a case study design should include the following five components:

- A study's questions
- Its propositions, if any
- Its unit(s) of analysis
- The logic linking the data to the propositions
- The criteria for interpreting the findings

In this thesis, the case study's question is synonymous with its objective. Yin states that propositions are not needed in exploratory studies and can be substituted with statements of purpose, which in this thesis include analyzing existing theories in literature and comparing them to case study data. Hence, the propositions described in the adapted theoretical framework below are not equal to the definition in the case study design. The unit of analysis is essentially the scope of the case, and can range from a single individual to global capital flow. Our case study will focus on the theoretical and practical MCS framework in an innovation firm in the context of an IPO process.

Due to the complex and shifting variables present in case studies, the last two components in the research design have been the least developed.<sup>20</sup> Unlike with statistical generalizations, there are no statistically significant correlations or causalities. Instead, Yin recommends one of three general analysis strategies: 1) relying on theoretical propositions, 2) rival explanations and 3) developing a case description. We choose to merge the first two strategies, a useful combination that will guide both the data collection and the analysis.

<sup>20</sup> Yin, 2003.



## 2.4 Case study subject selection

Case studies can include either single or multiple cases. Yin advocates for multiple-case studies in general, although single-case studies can be useful in several circumstances, such as when critically testing a well-established theory or a previously scientifically undocumented phenomenon, the latter being applicable in this study.<sup>21</sup>

Given that our unit of analysis is the MCS framework in an innovation firm post-IPO, the following criteria for our case subject apply:

- A firm publically listed on OMX within the past three years
- A firm with an innovation-driven core business

Additionally, accessibility is an important factor in determining which firms to contact, and due to the limited time and resources available in this thesis, smaller companies are preferred over larger ones. The three-year time frame has been applied in previous quantitative studies on post-IPO issues<sup>22</sup> and is sufficiently long for organizational changes to be established, but short enough for low turnover of staff with insight into the IPO process.

Today, roughly 300 companies are listed on the NASDAQ OMX Stockholm exchange. After excluding firms on the Large Cap list due to their size and long history on the stock exchange, the remaining actively traded firms were researched and contacted when matching the criteria. This resulted in us gaining access to a firm within the medical device industry, founded in 1997 and listed on the stock exchange in 2007 (hereafter company X). As a company founded on the basis of breakthrough clinical research with a strong patent portfolio, this firm is considered an innovation firm for the purposes of this thesis. Although a multiple-case study would have provided stronger empirical evidence, designing a single-case study is substantiated by the exploratory objective together with the scarce research on the combined topics of innovation, IPOs and MCS.<sup>23</sup>

## 2.5 Case study data collection

Yin lists three principles for maximizing the data collection and increasing validity and reliability (concepts further discussed in the next section): using multiple sources of evidence, creating a case study database and maintaining a chain of evidence. In this thesis, Appendix A and this method chapter represent the latter two. He additionally lists six possible sources of evidence in a case study: documentation, archival records, interviews, direct observations, participant-observations and physical artifacts. All have inherent strengths and flaws, and are therefore highly complementary.

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<sup>21</sup> Yin, 2003.

<sup>22</sup> See e.g. Jain & Kini, 1994.

<sup>23</sup> Yin, 2003.

Triangulating multiple data sources supports the analysis with diverse measures of the same phenomenon. We therefore use both documentation and interviews as sources, combining the objectivity, exactness and broad coverage of documentation with the targeted insights from interviews. Another potential data source would be direct observations, which however is outside our scope of access at the studied company. The documentation includes both internal and external documentation, organizational charts, and was received after signing a company standard Non-Disclosure Agreement with the CFO. Additional data is gathered from external sources such as international regulations and standards, e.g. by the International Organization for Standardization (ISO) and the US Food and Drugs Administration (FDA).

The 1-hour interviews were booked by phone and confirmed through email, and conducted by both authors and transcribed (see appendices). The chosen respondents all began employment before the IPO and are responsible for innovation and control systems in the company. To minimize response bias, respondents' names are anonymized.

Interviews were conducted at the company's office with the following respondents:

- The Chief Financial Officer (CFO)
- The Human Resources Manager (HR Manager)
- The Vice-President of Development and Technical Operations (VP D&T)
- The Director of Quality Assurance and Regulatory Affairs (Director QA&Reg)
- A Project Manager of a Product Development Project (PM)

The questions asked were prepared and are documented in the appendices. Asking open-ended questions enabled a high degree of adaption and flexibility in an un-biased manner during the interviews, and answers were often expanded upon after using follow-up questions. The respondents had no prior knowledge of the questions asked. Each interview began with a short statement of our thesis objective and anonymity policy, followed by the respondents' self-introduction to his or her position and employment history at the company.

## **2.6 Validity and reliability**

The quality of a case study and its research design are commonly judged by the following criteria:<sup>24</sup> construct validity (establishing correct operational measures for the studied concepts), internal validity (for explanatory or causal studies only), external validity (establishing the domain for generalization of findings) and reliability (demonstrating that the operations of a study can be repeated with the same results). Construct validity, like maintaining a chain of evidence, is reflected in the method description and the empirical documentation. Single-case studies are often, with some merit, criticized for poor external validity, a weakness we strive to

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<sup>24</sup> Yin, 2003.

overcome by relying on clearly framed and adapted theoretical propositions and rival explanations in a largely uncharted research area. By documenting our data collection and our methods, we hope to attain an appropriate measure of reliability.

## 3. Theory

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### 3.1 Definitions and concepts

#### 3.1.1 The concept of innovation

The concept of innovation has been subject to a multitude of definitions in academic literature as well as in practice. Following Schumpeter, “the father of innovation theory,”<sup>25</sup> definitions such as *the introduction of new elements or a new combination of elements in the production or delivery of manufactured and service products* are prevalent.<sup>26</sup> Furthermore, OECD asserts that *an innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.*<sup>27</sup> Similarly, Amabile suggests that *organizational innovation is the successful implementation of creative ideas within an organization.*<sup>28</sup> All of these definitions recognize that innovation is close to invention, in the sense that creativity or newness of ideas is an important feature.

Whereas invention refers to the creative idea itself, however, innovation also includes successful implementation in an organizational context, as emphasized by the two latter definitions. In practice, researchers have found the need to convert the concept of innovation into substantial, testable reality. Consequently, literature concerning the relationship between management control and innovation is mainly concerned with determining the optimal control systems designs for the different stages of new product development (NPD). Davila distinguishes between five different phases in NPD projects: 1) planning, 2) concept design, 3) product design, 4) testing and 5) production start-up.<sup>29</sup> Christianson makes a somewhat similar distinction, as reflected in Figure 2 below, by additionally incorporating the continuous process of updating and maintenance of products already implemented.<sup>30</sup>

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<sup>25</sup> Sundbo, 2001.

<sup>26</sup> Sundbo, 2001.

<sup>27</sup> OECD, 2005.

<sup>28</sup> Amabile, 1989.

<sup>29</sup> Davila, 2000.

<sup>30</sup> Christianson, 2000.

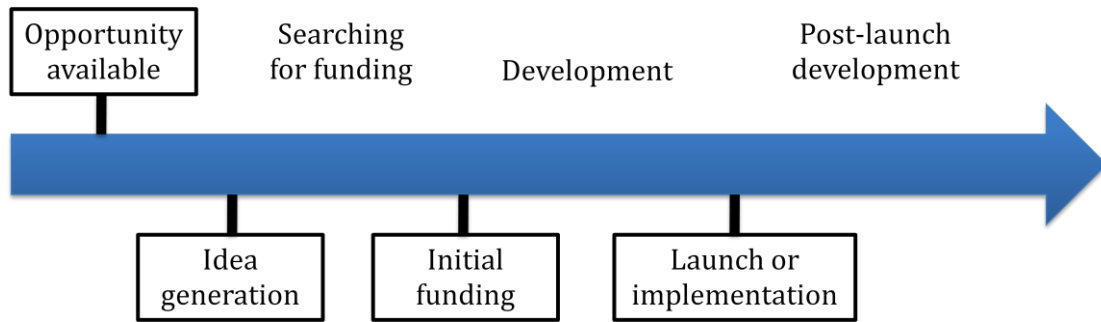


Figure 2. Adapted from Christianson (2000).

Previous theoretical work on innovation has not been able to reach a consensus regarding the ideal phase as focus for research purposes, leaving the field unsettled in this issue.<sup>31</sup> Therefore, due to the exploratory nature of our research method, we have chosen to take a broader perspective on this issue. By defining the entire - arguably rather general - concept of NPD as being within the research scope, we choose not to focus on potential distinctions between the different phases of the NPD process.

Following Schumpeter, innovation is the fundamental driver of economic development by a dynamic process labeled *creative destruction*. According to this view, innovation is dichotomized, with incremental innovation and radical innovation offering distinct implications for changes in the economic environment. Whereas radical innovation often represents a revolutionary impact on everyday life, incremental innovation occurs far more frequently, implicating continuous improvement of existing products.<sup>32</sup> As a result of the core business of our chosen case study subject, our natural focus is incremental innovation, e.g. maintenance and enhancement of existing products, including NPD for replacement and introduction of new product lines.

Another academically established distinction is made between explorative and exploitative research.<sup>33</sup> Exploitative research involves recombining aspects of already familiar knowledge in the search for new knowledge, whereas explorative research is based on combining aspects of new or distant knowledge in the search for new knowledge.<sup>34</sup> Academic research indicates different market strategies should be pursued depending on organizational orientation,<sup>35</sup> which is significant to our study in terms of the influence of an IPO on MCS.

Any research and development activity includes an element of uncertainty,<sup>36</sup> with studies concluding that mainstream management accounting systems, - e.g. budgets, variance analyses - may be unsuitable in such non-producing organizational units.<sup>37</sup> In particular, the optimal

<sup>31</sup> For examples of differing views see Davila, 2000 and Poskela, 2009.

<sup>32</sup> Schumpeter, 1934.

<sup>33</sup> See e.g. Wu, 2006, March, 1991.

<sup>34</sup> Wu, 2006.

<sup>35</sup> Morgan & Berthon, 2008.

<sup>36</sup> Rockness & Shields, 1984.

<sup>37</sup> See e.g. Rockness & Shields, 1984, Davila, 2000, and Abernethy & Brownell, 1997.

relationship between cost and output is rarely known and may even be impossible to determine, and it is often not possible or useful to measure output of the activity performed in monetary terms. Ouchi<sup>38</sup> and Perrow<sup>39</sup> have, among others, made efforts towards specifying this uncertainty. Both frameworks categorize organizational characteristics in two dimensions, each with two parameters along a continuum, typically ranging from one extreme to the other. While Ouchi identifies the relevant task characteristics as the degree of knowledge of the transformation process and measurability of output, Perrow suggests that uncertainties can be categorized along a continuum of task analyzability and routineness in performed tasks.<sup>40</sup> Characterizing innovation as structures of uncertainty makes the concept of organizational innovation an essential feature of R&D and NPD projects. Moreover, it has important implications for the choice of management control systems made by the organization,<sup>41</sup> as explored and explained further below.

### 3.1.2 The concept of IPOs

In initial public offerings, or IPOs, private firms become listed on public stock exchanges by issuing shares for the public to buy. To qualify for an IPO on the NASDAQ OMX Stockholm Stock Exchange, a company has to fulfill certain listing requirements.<sup>42</sup> The most important of these are three published annual accounts prior to the IPO, sufficient operating history, documented earnings capacity, publicly offering at least 25% of the shares and having a qualified board and management team.

In order to highlight the effect of the IPO process on MCS, it needs to be placed in a broader context in an organization's development. A company typically goes through several distinct growth stages in its firm life cycle, with systematically varied strategies, structures and management styles in each stage.<sup>43</sup> Academic research is abundant with various multiple-stage life-cycle theories which typically correlate corporate growth with corporate size and age,<sup>44</sup> although dimensions such as venture capital and CEO changes also can be applied to describe corporate development.<sup>45</sup> Life-cycle frameworks have been widely supported conceptually and empirically,<sup>46</sup> and can be applied commendably to MCS research,<sup>47</sup> especially with regards to the diverse MCS requirements in different growth stages.<sup>48</sup>

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<sup>38</sup> Ouchi, 1977.

<sup>39</sup> Perrow, 1967.

<sup>40</sup> For further information see Appendix B: tables.

<sup>41</sup> See e.g. Ouchi, 1977, Abernethy & Brownell, 1997, and Rockness & Shields, 1984.

<sup>42</sup> NASDAQ OMX Stockholm, 2010.

<sup>43</sup> Miller & Friesen, 1984.

<sup>44</sup> See e.g. Greiner, 1998.

<sup>45</sup> Davila, 2005.

<sup>46</sup> Moores & Yuen, 2001.

<sup>47</sup> Granlund & Taipaleenmäki, 2005.

<sup>48</sup> For a concise summary of some of the literature, see Appendix 1 in Sandino, 2004.

Considering both the internal and external operating environment of an innovation firm,<sup>49</sup> two models are especially useful for highlighting the role of an IPO in such an organization. The first is Parker's venture life cycle for entrepreneurship research,<sup>50</sup> which is divided into five stages: 1) venture initiation, 2) market entry and venture creation, 3) venture financing, 4) venture development and 5) venture performance and harvesting, including IPOs (see Figure 3). This model can be combined with Churchill & Lewis' framework,<sup>51</sup> which is divided into five stages indexed by size, diversity and complexity: 1) existence, 2) survival, 3) success, 4) take-off and 5) resource maturity.

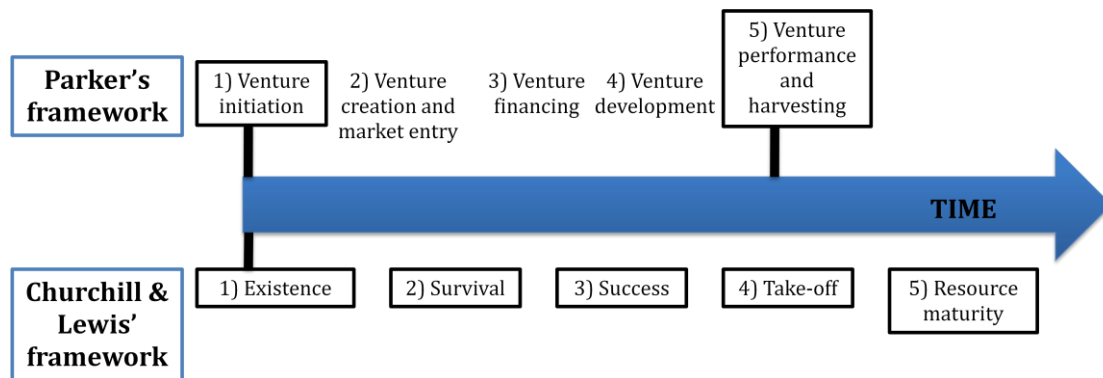


Figure 3. Adapted from Parker (2006) and Churchill & Lewis (1983).

Both frameworks are especially relevant for small and growing ventures, in contrast with more established frameworks.<sup>52</sup> The final step in Parker's venture life cycle is performance and harvesting, when investors realize the returns of their investments. IPOs are a form of harvesting preferred by both owners and managers,<sup>53</sup> and undertaken for two reasons: to raise capital for their own use (a "primary" offering) or for the existing shareholders to use in other investments (a "secondary" offering).<sup>54</sup> The process usually takes place in the take-off stage, a pivotal high-growth period with diverging ownership and management, and investors or creditors replacing owners who cannot manage growth or effective delegation.<sup>55</sup>

There are several reasons for going public, of which many are related. The main reason is obtaining finance,<sup>56</sup> usually for future growth or sometimes to rebalance the firm's financial structure.<sup>57</sup> Other main reasons in academic literature lists include: minimizing cost of capital, allowing insiders to cash out, facilitating takeover activity through increasing liquidity and

<sup>49</sup> Granlund & Taipaleenmäki, 2005.

<sup>50</sup> Parker, 2006.

<sup>51</sup> Churchill & Lewis, 1983.

<sup>52</sup> See e.g. Miller & Friesen, 1984 and their life-cycle framework of Birth – Growth – Maturity – Revival – Decline or Greiner, 1998 and his Evolution and Revolution framework.

<sup>53</sup> Parker, 2006.

<sup>54</sup> Geddes, 2003.

<sup>55</sup> Churchill & Lewis, 1983.

<sup>56</sup> Ellingsen & Rydqvist, 1997.

<sup>57</sup> Pagano et al, 1998.

serving as a strategic move.<sup>58</sup> Testing for several hypotheses, Brau found that the five foremost reasons for an IPO were facilitating takeover activity, establishing a market value for the firm, enhancing company reputation, broaden ownership base and minimizing cost of capital.<sup>59</sup> Although costs such as underwriting fees are often proportionate to the capital raised, many of the other costs associated with an IPO – i.e. marketing, legal and auditing – are essentially fixed, resulting in significant economies of scale.<sup>60</sup>

### 3.2 Overview of management control systems theories

Fundamentally, management control is one of the key activities in an organization that allows it to function effectively, by ensuring proper strategy implementation, preventing dysfunctional personnel behavior, and enabling coordination, focus and stakeholder reporting in the organization.<sup>61</sup> Since its introduction in the 1960s, MCS definitions have been subject to significant development and modification. Initially, Anthony viewed MCS as *the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives*,<sup>62</sup> a classic definition aimed at broadening the range of information beyond accounting information. However, focusing on commonalities instead of operational control – which varied between organizations – paradoxically limited the scope to accounting-based controls, which influenced subsequent research in the 1970s and 1980s.<sup>63</sup> Re-focusing on management control in broader sense, Merchant later extended the definition to *systems managers use to ensure that employee behaviors and decisions are consistent with the organization's objectives and strategies*,<sup>64</sup> including both proactive and reactive controls. Succeeding work endeavored to connect MCS to organizational objectives more explicitly. For instance, Simons' definition of MCS as *the formalized procedures and systems that use information to maintain or alter patterns in organizational activity*<sup>65</sup> links MCS to the strategy formation process as well as the subsequent strategy implementation. While being different in many aspects, these definitions all consider MCS mainly as a tool for aligning people, thereby attaining goal congruence within the organization, a view we will maintain throughout this thesis.

The large body of literature on MCS contains several complementing, contrasting and overlapping theoretical frameworks. In this study, we have chosen to rely on a broad MCS framework developed by Hales, as explained further below.<sup>66</sup> Additional complementary views

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<sup>58</sup> For a concise overview of literature on motivations for IPOs, see Appendix C in Brau, 2006.

<sup>59</sup> Brau, 2006.

<sup>60</sup> Jenkinson & Ljungqvist, 2000.

<sup>61</sup> Poskela, 2009.

<sup>62</sup> Anthony, 1965.

<sup>63</sup> Otley, 1999.

<sup>64</sup> Merchant 1982, 2003.

<sup>65</sup> Simons, 1990.

<sup>66</sup> Hales, 1993.



on the concept of MCS are introduced, with relevant features subsequently incorporated into Hales' framework, creating a meta-framework that aspires to offer a comprehensive theoretical foundation for our analysis.

In his work, Simons connects management control to different strategic objectives of the organizations.<sup>67</sup> In doing so, he identifies four key control mechanisms, each serving a specific strategic objective. According to Simons, belief systems should be implemented to align employees to the core values of the organization, while boundary control systems are exercised to avoid risks and threats. Diagnostic control systems are used to motivate, monitor and reward employee performance and achievement, and, lastly, interactive control systems should stimulate organizational learning and avoid strategic uncertainties. No single control function is suitable for all circumstances, which is of particular importance in this study; instead, Simons points out the importance of maintaining a balance that best serves the organization's purposes.

Ouchi suggests that management control phenomena appear in three, conceptually distinct, categories: market control, bureaucratic control and clan control.<sup>68</sup> Within market control, all information needed for decision-making is contained in prices, making other control systems redundant. Bureaucratic control, on the other hand, calls for more explicit control mechanisms, and clan control relies on the implicit understanding among employees of a shared and internalized set of cultural values and norms. It has been argued that the consensus in a well functioning clan control system may inhibit innovation, since it ensures personnel alignment and may thus induce groupthink.<sup>69</sup> However, Ouchi, and later Merchant, maintain that highly uncertain activities – i.e. in research labs – require clan control to accommodate the necessary flexibility,<sup>70</sup> an ambiguity highlighted in Hales' adapted framework below.

The theoretic framework originally presented by Merchant includes three types of controls: action control, results control and personnel control.<sup>71</sup> Action control aims to ensure that employees perform in accordance with the managers' wishes, using behavior constraints, action accountability and pre-action review. Results control holds employees responsible for the outcomes of their actions, using results accountability tools such as standards and budgets. Personnel control emphasizes the organization's reliance on its employees, and includes competence development through i.e. job training, improving group communications and encouraging peer control. In his later works, Merchant<sup>72</sup> separated personnel control into personnel and cultural control, where the latter highlights the importance of shared group values and norms.

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<sup>67</sup> Simons, 1995.

<sup>68</sup> Ouchi 1979.

<sup>69</sup> Van der Ven, 1986.

<sup>70</sup> Ouchi 1979, Merchant 1982.

<sup>71</sup> Merchant 1982.

<sup>72</sup> Merchant 2003.



### 3.3 Hales' MCS framework

All frameworks described above have their advantages and limitations. As earlier mentioned, we will instead lean on a broad, general definition using Hales' classification of management control,<sup>73</sup> which differentiates between the focus of control and the styles of control. In an extensive survey study on management control in the front end of innovation by Poskela,<sup>74</sup> Hales' framework is identified as the most comprehensive overview for integrating separate theoretical frameworks, especially regarding innovation research, and it is therefore the foundation of our discussion of MCS.

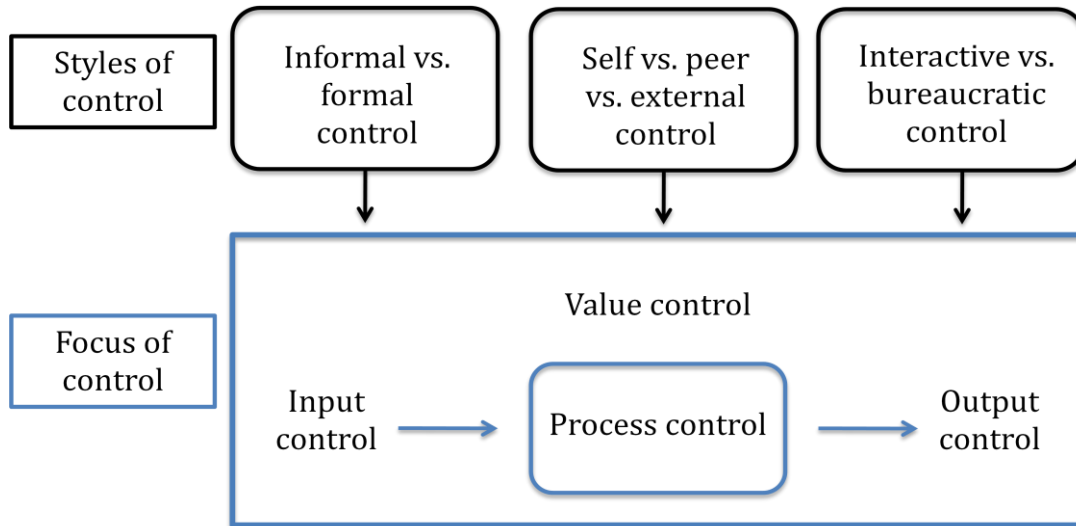


Figure 4. Adapted from Hales (1993).

#### Focus of control

##### *Input control*

Input control comprises the *ex ante* control over the resources, skills and organizational infrastructure needed to perform a task. Simons' boundary systems, which delineate the acceptable domain of activity for organizational participants, are one example of input control in an MCS framework.<sup>75</sup> The part of Merchant's personnel control that emphasizes employee education and clear job assignments is another example, since human resources management often concerns a firm's most invaluable inputs.<sup>76</sup>

##### *Process control*

Process control focuses on the technical and behavioral methods used in performing a task. It is often seen as an alternative to output control, and both are amongst the most widely discussed control types in the literature.<sup>77</sup> Action and behavior control in Merchant's theoretic framework<sup>78</sup>

<sup>73</sup> Hales 1993

<sup>74</sup> Poskela, 2009.

<sup>75</sup> Simons, 1995.

<sup>76</sup> Merchant 1982, 2003.

<sup>77</sup> Simons, 1995 and Poskela, 2009.

<sup>78</sup> Merchant 1982, 2003.

are two examples of process control, together with more concrete examples such as process models, standard operating procedures (SOPs) and steering groups.<sup>79</sup> A broader example of process control is Simons' interactive control systems, which stimulates organizational learning and enables managers to involve themselves personally and regularly in their employees' operations.<sup>80</sup>

#### *Output control*

Output control is, in its simplest form, an MCS where employees are held responsible only for their results. The results control in Merchant's framework is a well-recognized example of output control, and it is implemented through 1) defining the performance dimensions used in assessing the results; 2) measuring performance on these dimensions; 3) setting performance targets and 4) providing rewards or punishments in order to achieve the desired results.<sup>81</sup> However, the effectiveness of results controls depends on managers' knowledge of the desired results, whether they can measure the results effectively and whether employees have significant influence on the results for which they are held accountable. Simons' diagnostic control systems are another example of output control and - similar to Merchant - require output measurability, pre-determined performance targets and dimensions and the opportunity to correct target deviations.<sup>82</sup> Ouchi and Maguire found that output control is used when managers need to legitimize their actions, which paradoxically occurs in the least appropriate situations: in the face of complexity, interdependencies and lack of expertise.<sup>83</sup>

#### *Value control*

Hales defines value control as the notions employees hold of "*what is important and desirable*," synonymous with Simons' formal belief systems, which provide basic values, purpose and direction for the organization through i.e. mission statements and credos. Ouchi's clan control, emphasizing shared values and beliefs on a group level, is a similar example, but it can be viewed as distinct from value control due to the latter's focus on culture on an organizational level.<sup>84</sup> Merchant's cultural control focuses on mutual monitoring in groups, like Ouchi's clan control, but assumes pre-existing organizational norms and values.<sup>85</sup> An innovation-supportive organizational culture is widely recognized as essential to business creativity,<sup>86</sup> which in turn is considered vital to economic development.<sup>87</sup>

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<sup>79</sup> Poskela, 2009.

<sup>80</sup> Simons, 1995.

<sup>81</sup> Merchant 1982, 2003.

<sup>82</sup> Simons, 1995.

<sup>83</sup> Ouchi & Maguire, 1975.

<sup>84</sup> Poskela, 2009.

<sup>85</sup> Merchant, 2003.

<sup>86</sup> See e.g. Damanpour, 1991; Simons, 1995; Amabile, 1998.

<sup>87</sup> Schumpeter, 1934.

## Styles of control

### *Formal and informal control*

This dichotomy emphasizes the distinction between visible, objective MCS components such as written company regulations and standard operating procedures, and unintentional, emergent components such as unwritten rules and policies.<sup>88</sup> Kirsch synthesizes examples in literature of formal and informal “*mechanisms utilized to exercise control*”<sup>89</sup> – measurement, evaluation and reward – in other words, what we term output control. Anthony and Govindarajan discuss formal and informal controls with regards to value control, but in Hales’ framework, informal or formal styles of control can be applied to any focus of control.<sup>90</sup>

### *Self-control, peer control and external control*

Self, peer and external control refers to the locus of responsibility for implementing control. In Hales’ framework, external control includes both personal control exercised by individuals, and impersonal control exercised through rules and regulations.<sup>91</sup> The former often refers to traditional top-down management, while the latter is a broader category including both organizational and market regulations.<sup>92</sup> Although external control is most commonly associated with MCS, self and peer control can be actively managed and encouraged as well.<sup>93</sup> Peer control includes Ouchi’s clan control, Merchant’s culture and personnel control and focuses on group monitoring, making it the most adaptable and suitable MCS for projects with low task programmability and low output measurability. Self control involves the application of internalized rules, values and norms of behavior,<sup>94</sup> and assumes that employees are intrinsically motivated to want to perform well and be naturally committed to the organization’s goals.<sup>95</sup>

### *Bureaucratic and interactive control*

Simons defines interactive control systems as formal information systems used to establish a regular, interactive dialogue between managers and employees. This style of control can be used on any MCS in order to innovate, adapt, and hedge against strategic uncertainties that could impede the current business strategy. Applying interactive control systems requires regular forecasting, comprehensible data, vertical organization utilization, subsequent action and implementation and above all, the information collected and generated must be related to the effects of strategic uncertainties. In contrast, bureaucratic control – often synonymous with

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<sup>88</sup> Langfield-Smith, 1997.

<sup>89</sup> Kirsch, 2004.

<sup>90</sup> Anthony & Govindarajan, 2007.

<sup>91</sup> Hales, 1993.

<sup>92</sup> Poskela, 2009.

<sup>93</sup> Poskela, 2009.

<sup>94</sup> Hales, 1993.

<sup>95</sup> Merchant, 2003.

centralized and formalized control<sup>96</sup> – can be defined as impersonal control through rules and regulations.<sup>97</sup>

### 3.4 Hales' adapted MCS framework for innovation and IPOs

As we have seen, Hales' framework can be adapted to include both complementing and contrasting theories. The following research on MCS and innovation and MCS and IPOs, respectively, combine established models and studies integrating multiple research areas. Each study addresses different factors in the framework, in order to incorporate all parts of the innovation process and provide a comprehensive theoretical foundation for evaluating the empirical data and performing the subsequent analysis. Each control aspect is discussed separately in the contexts of control and innovation, control and IPOs and, if possible innovation and IPOs. However, it is important to keep in mind that the different control aspects are neither mutually exclusive nor collectively exhaustive, inevitably resulting in overlapping concepts in parts of the discussion.

Poskela is the main theoretic foundation regarding MCS and innovation, due to his systematic synthesis of contemporary research in one of the first quantitative studies analyzing management control in the front end of innovation.<sup>98</sup> Other studies by, amongst others, Rockness & Shields,<sup>99</sup> Davila<sup>100</sup> and Cardinal,<sup>101</sup> complement Poskela's findings by focusing on other stages of the innovation process. The multiple and occasionally conflicting research findings ensure a comprehensive theoretic foundation for analyzing MCS in innovation firms.

Very few studies have focused directly on MCS and IPOs, instead examining the effects of ownership changes,<sup>102</sup> persisting founder influence<sup>103</sup> or organizational change,<sup>104</sup> often using life-cycle models as a theoretical foundation.<sup>105</sup> Trostel & Nichols<sup>106</sup> survey study comparing management processes and strategic choices in publicly-held and privately-held companies is, in our opinion, the most applicable research equivalent to a longitudinal comparison of MCS in companies before and after IPOs. The previously noted studies, especially regarding life-cycle models, serve as complementing theories in this area.

Regarding IPOs and innovation, research has generally focused on ownership structure and R&D spending in general,<sup>107</sup> or innovation related to agency costs,<sup>108</sup> a conceptually<sup>109</sup> and

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<sup>96</sup> Damanpour, 1991.

<sup>97</sup> Poskela, 2009.

<sup>98</sup> Poskela, 2009.

<sup>99</sup> Rockness & Shields, 1984.

<sup>100</sup> Davila, 2000.

<sup>101</sup> Cardinal, 2001.

<sup>102</sup> See e.g. Bruining et al, 2004 regarding MCS and buyouts.

<sup>103</sup> See e.g. Nelson, 2003.

<sup>104</sup> See e.g. Chenhall & Euske, 2007.

<sup>105</sup> See e.g. Sandino, 2004, Moores & Yuen, 2001, Greiner, 1998 and Davila, 2000.

<sup>106</sup> Trostel & Nichols, 1982.

<sup>107</sup> See e.g. Baysinger, 1991.

<sup>108</sup> See e.g. Francis & Smith, 1995.

empirically<sup>110</sup> established result of more dispersed ownership structures. However, Wu's<sup>111</sup> quantitative study on the interdependence of organizational learning and financing examines whether, how and when going public affects firms' innovative activities, and is therefore appropriate as the key theoretical foundation in this area.

### 3.4.1 Focus of control

#### Input control

Poskela found that input control in the forms of task definition, goal specification and allocation of human resources were positively associated with long-term innovation performance.<sup>112</sup> This supports Rockness & Shield's<sup>113</sup> conclusions, using Ouchi's framework,<sup>114</sup> that input control in terms of personnel selection and R&D expenditure budgeting are negatively associated with high knowledge of transformation processes, such as in routine tasks. In a survey study of 57 pharmaceutical firms, Cardinal<sup>115</sup> concluded that input control enhanced both radical and incremental innovation, thereby reinforcing the earlier findings.

The boundary systems in Simons' framework<sup>116</sup> set broad, formal limits and encompass both general codes of conduct and specific capital budgeting systems. Life-cycle theory indicates a gradual formalization through the different stages in company development,<sup>117</sup> and a common occurrence after IPOs in particular.<sup>118</sup> Although IPOs are considered detrimental to the innovation process in high-technology firms especially,<sup>119</sup> Wu's study only partly justifies this. She found that overall innovation rates increase after an IPO, but encompassing a shift from explorative to exploitative innovation.<sup>120</sup> Furthermore, Trostel & Nichols concluded in their study on management processes in privately-held and publicly-held firms that, contrary to their hypothesis, there were equal amounts of formal policies and guidelines in both types of firms.<sup>121</sup> Given this, we suggest that **input control is positively associated with innovation, and not directly influenced by an IPO.**

#### Process control

As previously stated, process control encompasses action and behavior control as well as interactive control systems, with research yielding differing conclusions. Rockness and Shields

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<sup>109</sup> See e.g. Jensen & Meckling, 1976.

<sup>110</sup> Gogineni et al, 2009.

<sup>111</sup> Wu, 2006.

<sup>112</sup> Poskela, 2009.

<sup>113</sup> Rockness & Shields, 1984.

<sup>114</sup> Ouchi, 1979, 1977.

<sup>115</sup> Cardinal, 2001.

<sup>116</sup> Simons, 1995.

<sup>117</sup> Davila, 2005.

<sup>118</sup> Stuart & Sorenson, 2003.

<sup>119</sup> Stuart & Sorenson, 2003.

<sup>120</sup> Wu, 2006.

<sup>121</sup> Trostel & Nichols, 1982.

concluded in their study that behavior controls, consisting of formal rules and operating procedures, are most important when there is a high knowledge of the transformation process itself,<sup>122</sup> in contrast with Abernethy and Brownell's conclusions that behavior control does not contribute to performance under any circumstances.<sup>123</sup> Poskela discussed process control in terms of process formalization, concluding it was positively associated with both product concept superiority and strategic renewal, i.e. both short- and long-term innovation performances. Only in the context of technology uncertainty was a negative association between process formalization and strategic renewal marginally supported.<sup>124</sup> On the other hand, Cardinal found that radical innovation - which embodies new knowledge and therefore often more uncertainty - was enhanced by behavior control, contrary to the results for incremental innovation.<sup>125</sup> In a broader context, Ylinen's dissertation showed that interactive control systems both improved project performance and led to greater product innovation,<sup>126</sup> in contrast with Bisbe and Otley's survey study on product innovation.<sup>127</sup>

Process control in an IPO context is mostly discussed in terms of formalization,<sup>128</sup> which generally increases with each stage in a company's development.<sup>129</sup> Consequently, **process control, particularly formal rules, procedures and policies, are generally positively associated with innovation and is not directly influenced by an IPO.**

## Output control

In terms of outcome rewards, Poskela found no association with innovation, which is in line with the conflicting evidence on the applicability of output control.<sup>130</sup> While outcome rewards may enhance performance in longer or less complex product development projects, they have a detrimental effect on product quality in risky projects or in highly competitive industries.<sup>131</sup> Financial incentives were in a meta-analysis found to be unrelated to performance quality,<sup>132</sup> and may instead lead to dysfunctional behavior and decreased intrinsic motivation.<sup>133</sup> However, applying Merchant's control framework, Cardinal found that increased output control enhanced both incremental and radical innovation.<sup>134</sup>

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<sup>122</sup> Rockness & Shields, 1984.

<sup>123</sup> Abernethy & Brownell, 1997.

<sup>124</sup> Poskela, 2009.

<sup>125</sup> Cardinal, 2001.

<sup>126</sup> Ylinen, 2004.

<sup>127</sup> Bisbe & Otley, 2004.

<sup>128</sup> Trostel & Nichols, 1982, Stuart & Sorenson, 2003 and Wu, 2006.

<sup>129</sup> See e.g. Moores & Yuen, 2001.

<sup>130</sup> Poskela, 2009.

<sup>131</sup> Sarin & Mahajan, 2001.

<sup>132</sup> Jenkins Jr et al, 1998.

<sup>133</sup> Simons, 1995.

<sup>134</sup> Cardinal, 2001.

Incentive systems are often one of the internal organizational adjustments following an IPO, together with increased bureaucracy and formalization.<sup>135</sup> The effects of these adjustments are ambiguous however,<sup>136</sup> and have not been directly tested in any studies we are aware of. Given the inconclusive research, **we propose that output control is not associated with innovation and not directly influenced by an IPO.**

### **Value control**

An exploratory study found that ethnic culture affected the perception of MCS, pointing to lower costs in Japanese firms as a possible result of the homogenous values and beliefs between workers and managers, compared to U.S. firms.<sup>137</sup> Value controls can be defined broadly, including Simons' formal belief systems,<sup>138</sup> Ouchi's clan control<sup>139</sup> as well as Merchant's culture control,<sup>140</sup> with some concepts overlapping with self- and peer control. Clan control is suitable when both output measurability and knowledge of the transformation process are low, with a research lab as a typical example.<sup>141</sup> Organizational culture is proposed as one determinant of creative behavior in organizations,<sup>142</sup> and perceived managerial support for change, together with internal and external communication, has been positively associated with innovation and creativity.<sup>143</sup> However, the paradoxical interplay between flexibility and control in an innovation-supportive culture makes successful implementation a challenge.<sup>144</sup> To our knowledge, the relation between value control and IPO has yet to be studied. However, given that organizational culture is a fluid, intangible concept adapted and developed by all members of an organization, any changes are likely to occur gradually and not as a result of an IPO. Consequently, **supportive value control is likely positively associated with innovation, but not directly influenced by an IPO.**

### **3.4.2 Styles of control**

#### **Formal and informal control**

Research has yielded conflicting results on the influence of formal or informal control on innovation. On one hand, increased bureaucracy and formalization is assumed to stifle innovation<sup>145</sup> and suitable only when task uncertainty is low,<sup>146</sup> with innovation thriving in

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<sup>135</sup> Stuart & Sorenson, 2003.

<sup>136</sup> Wu, 2006.

<sup>137</sup> Birnberg & Snodgrass, 1988.

<sup>138</sup> Simons, 1995.

<sup>139</sup> Ouchi, 1979.

<sup>140</sup> Merchant & Van der Stede, 2003.

<sup>141</sup> Ouchi, 1979.

<sup>142</sup> Woodman et al., 1993.

<sup>143</sup> Damanpour, 1991, Amabile, 1998 and Chandler, et al, 2000.

<sup>144</sup> Khazanchi et al., 2007.

<sup>145</sup> See e.g. Damanpour, 1991 and Amabile, 1998.

<sup>146</sup> Abernethy & Brownwell, 1997.

organizations with fewer formalized HR practices and innovation-supportive cultures.<sup>147</sup> On the other hand, in Poskela's study, formalized process control was positively associated with innovation – the benefits greater than the costs of formalization<sup>148</sup> – and Wu highlighted both the increased formalization due to an IPO and the subsequent increase in innovation rate.<sup>149</sup> Additionally, Poskela found no existing association between informal communication and innovation.<sup>150</sup> Consequently, formality and informality should be viewed as complementing, rather than mutually exclusive, styles of control, varying with the level of innovation<sup>151</sup> or the specific stage of an innovation process.<sup>152</sup> Therefore, the increased formalization in a firm due to its natural life-cycle development<sup>153</sup> – of which IPOs are a distinctive part<sup>154</sup> – will likely not impede innovation if suitably adapted, which corroborates the lack of difference between privately- and publicly-held firms in terms of formalization of planning.<sup>155</sup> Thus, **formal control is positively associated with innovation, and influenced by an IPO, whereas informal control is neither associated with innovation nor influenced by an IPO.**

### **Self-control, peer control and external control**

Several studies emphasize the importance of self-control, in terms of intrinsic motivation, as a central element of organizational processes and increased managerial effectiveness.<sup>156</sup> Given that peer control is positively associated with self-control,<sup>157</sup> both styles of control have been found suitable for similar organizational settings. Personnel control, which encompasses both styles, is for example considered ideal for situations with low output measurability and poor knowledge of the transformation process<sup>158</sup> – similar to Ouchi's clan control<sup>159</sup> – as well as when task uncertainty is high.<sup>160</sup> Poskela concluded that intrinsic task motivation was positively associated with both short- and long-term innovation,<sup>161</sup> substantiating earlier views of intrinsic motivation as an essential part of organizational creativity.<sup>162</sup>

However, most MCS rely traditionally on external control, both personally through top management and impersonally through rules and policies. An IPO requires meeting a multitude

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<sup>147</sup> Chandler et al., 2000.

<sup>148</sup> Poskela, 2009.

<sup>149</sup> Wu, 2006.

<sup>150</sup> Poskela, 2009.

<sup>151</sup> Bisbe & Otley, 2004.

<sup>152</sup> Kirsch, 2004.

<sup>153</sup> Churchill & Lewis, 1983 and Moores & Yuen, 2001. See also Cardinal et al., 2004 for a dynamic model on the role of imbalance of formal and informal controls during the creation and evolution of organizational control.

<sup>154</sup> Stuart & Sorenson, 2003.

<sup>155</sup> Trostel & Nichols, 1982.

<sup>156</sup> Manz, 1986, Luthans & Davis, 1979 and Merchant & Van der Stede, 2003.

<sup>157</sup> Mills, 1983.

<sup>158</sup> Merchant, 1982.

<sup>159</sup> Ouchi, 1979.

<sup>160</sup> Abernethy & Brownell, 1997.

<sup>161</sup> Poskela, 2009.

<sup>162</sup> Woodman et al., 1993 and Amabile, 1998.



of regulations, both triggering internal organizational changes and acting as controls in themselves. Additionally, public firms are influenced by differing objectives and investment horizons, facing increased institutional pressure to increase shareholder value as well as greater scrutiny by capital market actors. Although innovation rates typically increase after an IPO, the net effect in individual cases depends on the magnitude of each of these changes.<sup>163</sup>

Weighing the research findings on these styles of control, **we propose that self-control, peer control and external control are positively associated with innovation, with only external control being influenced by an IPO.**

### **Bureaucratic and interactive control**

Bureaucratic control, in form of one-way diagnostic control systems using formal plans and regulations, has commonly been considered unsuitable for innovation activities with low output measurability and poor knowledge of the transformation process.<sup>164</sup> However, research exploring the interplay between interactive control systems and innovation has resulted in a more complex theoretical foundation. Although interactive control systems have been positively associated with technical type development projects, diagnostic control systems were instead positively associated with administrative type development projects.<sup>165</sup> Furthermore, Poskela found that participative planning, where managers and employees interact in dealing with issues, was not positively associated with innovation, contrary to his hypothesis.<sup>166</sup> This augmented an earlier finding challenging the enhancing effect of interactive MCS on innovation,<sup>167</sup> and interactive and bureaucratic control should possibly be viewed as complementing, rather than alternative styles of control.<sup>168</sup> Similarly, differences in styles of control with regards to an IPO can be questioned. Trostel and Nichols found that, contrary to their propositions, there were no differences between privately-held and publicly-held firms in terms of formalized planning or managerial participation.<sup>169</sup> Given this multi-faceted theoretical foundation, we suggest that **bureaucratic and interactive control are complementing styles both positively associated with innovation but not influenced by an IPO.**

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<sup>163</sup> Wu, 2006.

<sup>164</sup> Merchant, 1982, Simons, 1995, Abernethy & Brownwell, 1997 and Amabile, 1998.

<sup>165</sup> Ylinen, 2004.

<sup>166</sup> Poskela, 2009.

<sup>167</sup> Bisbe & Otley, 2004.

<sup>168</sup> Poskela, 2009.

<sup>169</sup> Trostel & Nichols, 1982.

## 4 Empirics

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Company X is in the medical technological devices industry, with new product development as its core business. Its founders, two researchers at the Karolinska Institute, started the company developing medical devices based on their research findings. Founded in 1997 and floated in early 2007, the company has experienced a journey from founder-owned enterprise to a corporation publicly listed on the Nasdaq OMX Stockholm exchange in less than a decade. The company has around 1800 shareholders with the seven largest holding around eighty percent, all private equity firms or institutional investors from prior to the IPO.<sup>170</sup> The founders are still active in the management team and on the board, but own collectively around one percent.<sup>171</sup>

Today, the company operates mainly in the Swedish market with international distribution partners, although there are fully owned subsidiaries present on site in Germany, Britain and the United States. The workforce currently includes some 60 employees, down from around 80 employees due to unpredictable market development during 2007-2008.<sup>172</sup> The company has had a practice of utilizing external expertise from the start through outsourcing of services and projects, although a joint NPD project with a large Japanese firm has warranted recent employment of in-house competence.<sup>173</sup> In 2009, the R&D post in the Income Statement amounted to 57 MSEK (37% of total costs), including maintenance, clinical development and production.<sup>174</sup>

### 4.1 Focus of control

#### **Input control**

Input control in company X concerns mainly personnel recruitment and competence development.<sup>175</sup> Many of those currently employed have worked in the company for several years, and while the relatively extensive hiring schemes and subsequent lay-offs have caused some turbulence recently, labor turnover had not exceeded one percent until then.<sup>176</sup> Accordingly, the majority of the current members of senior management have been in the company from the start; many of them leaving the same large corporation in the late 1990s.<sup>177</sup> Furthermore, staff homogeneity has been persistent, with a high academic level for all

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<sup>170</sup> Company X Annual Report 2009.

<sup>171</sup> Company X Annual Report 2009.

<sup>172</sup> Interview HR Manager.

<sup>173</sup> Interview HR Manager and PM.

<sup>174</sup> Income Statement, Company X Annual Report 2009.

<sup>175</sup> Interview HR Manager.

<sup>176</sup> Interview HR Manager.

<sup>177</sup> Interviews CFO, VP D&T and Director QA&Reg.

employees.<sup>178</sup> As more sales and marketing personnel is required, however, this firm characteristic has been somewhat modified.<sup>179</sup>

Several managers point out that company X is comparatively small in size, making each individual employee important relative to those in larger firms.<sup>180</sup> In addition, one executive asserts that the abilities of the individual employee are among the most crucial determinants of innovation performance, along with clearly defined tasks within the organization.<sup>181</sup> Thus, organizational ability to recruit the right people is vital, affecting company culture, internal balance as well as innovation performance. To ensure that the successful applicant possesses both the appropriate proficiency level and the personality to fit well within existing group dynamics, the company uses a semi-formalized structure for recruitment, with traditional interview sessions as well as personality analyses and competence-based problem-solving cases.<sup>182</sup> When recruiting external project managers and engineers, however, there are no established HR manuals. Instead this part of the workforce is acquired on a case-by-case basis.<sup>183</sup>

Every employee has to go through an introduction scheme as part of company introduction.<sup>184</sup> This includes getting acquainted with the staff manual, union agreements, insurances and pensions, and is required under the ISO 9000 standard as well as by FDA.<sup>185</sup> This highly formalized scheme also encompasses an introduction to company and individual targets, and lasts for three months.<sup>186</sup> The time needed for any new employee to completely integrate and actively contribute to the company as opposed to be a financial burden, however, is much longer – at least one year.<sup>187</sup> These rather extensive arrangements further highlight the importance of recruiting the right people from the start.<sup>188</sup>

As mentioned above, appropriate division of labor with clearly defined roles within the organization is considered to be crucial for innovation success.<sup>189</sup> Accordingly, as a part of the introductory training, the new employee is informed about her function and tasks, as well as responsibilities within the organization.<sup>190</sup> She also spends time with future colleagues, and additional individual competence development is undertaken regularly as well as by requirement.<sup>191</sup>

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<sup>178</sup> Interview CFO.

<sup>179</sup> Interview CFO.

<sup>180</sup> Interviews Director QA&Reg, HR Manager and VP D&T.

<sup>181</sup> Interview Director QA&Reg.

<sup>182</sup> Interview HR Manager.

<sup>183</sup> Interview PM.

<sup>184</sup> Interview HR Manager.

<sup>185</sup> See ISO 9000, FDA regulations.

<sup>186</sup> Interview HR Manager.

<sup>187</sup> Interview HR Manager.

<sup>188</sup> Interview HR Manager.

<sup>189</sup> Interview Director QA&Reg.

<sup>190</sup> Interview HR Manager, Business Handbook 2007.

<sup>191</sup> Interviews Director QA&Reg and HR manager.

Due to the nature of operations, the medical device industry is highly regulated, regardless of the company being privately or publicly held.<sup>192</sup> The recent IPO has not resulted in any substantial changes in recruitment procedures or other personnel issues.<sup>193</sup> Neither is the company required to comply with any additional regulations when it comes to recruitment, competence development or introduction schemes.<sup>194</sup>

### **Process control**

In terms of process control, company X is affected mainly by regulatory issues. It has to comply with the EU medical device directive,<sup>195</sup> various standards issued by ISO, as well as extensive regulations imposed by FDA.<sup>196</sup> Regulations are applicable both for organizational management control processes and for technical specifications of the final product.<sup>197</sup> Due to these extensive regulations, virtually all processes are highly formalized and rigorously documented.<sup>198</sup> Specifically, the company has to adapt all management processes in conformity with ISO 13485, the specific standard for management in medical technology firms. The main features of the standard are the specifications for required documentation, and prescriptions for quality assurance in management processes.<sup>199</sup> Although the actual implementation of an NPD process differs from case to case, there are some common features.<sup>200</sup> First, a cross-functional product committee discusses the impending NPD project and sets the general specifications.<sup>201</sup> If the preliminary project outline is within the pre-specified spending plan, the project can be launched. If the project, on the other hand, is likely to exceed its financial allowance, clearance from top management is required. Secondly, a task schedule is drawn up, a project manager is appointed and the project group is assembled. The project manager is responsible for the project from now on, and reports back to the committee, which in turn reviews the development process qualitatively. Compliance with ISO and FDA regulations, checklists and well-defined routines for construction, safety and design quality assurance are used.<sup>202</sup> While these regulations are applicable for all companies within the medical devices industry, stock market regulations have limited certain related financial information distribution as discussed below.

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<sup>192</sup> Interview Director QA&Reg; see also FDA regulations, ISO 9000 and ISO 13485.

<sup>193</sup> Interview HR manager.

<sup>194</sup> Nasdaq OMX Stockholm Exchange Listing Agreement.

<sup>195</sup> Council Directive 93/43/EEC of 14 June 1993 concerning medical devices.

<sup>196</sup> Interview Director QA&Reg.

<sup>197</sup> Interview Director QA&Reg; also FDA regulations and ISO 9000, 13485, and 14971.

<sup>198</sup> Interview Director QA&Reg.

<sup>199</sup> ISO 13485.

<sup>200</sup> Interview PM.

<sup>201</sup> Interview VP D&T.

<sup>202</sup> Interview VP D&T.

## Output control

While company X has to sustain a highly innovative focus on new product development, as well as maintenance and replacement, it is currently in a commercialization phase.<sup>203</sup> Being a small, recently listed company yet to become profitable,<sup>204</sup> it has to keep a profound result orientation in order to secure investor attention.<sup>205</sup> Several managers emphasizing the strong results focus in the company further affirm this<sup>206</sup> and consequently, output control is an important feature of the company's MCS. For instance, the director for development and technological operations holds it to be "more important that we reach our target, rather than to specify every step in detail. We have to let people make mistakes on the way."<sup>207</sup> Hence, the company has identified and established relevant and measurable targets – quantitative as well as qualitative – on company, group and individual level.<sup>208</sup> However, there are no rewards explicitly tied to target achievement on individual or group level for product developers.<sup>209</sup>

Nevertheless, outcome-based rewards are used for top management, who are evaluated on overall company performance, as well as specific individual targets relating to their individual responsibilities.<sup>210</sup> Staff assessment is partly carried out by the employees themselves by pointing to potential future deviations from individual targets during monthly reports preparations, while it is up to management to act on these early indications.<sup>211</sup> In addition, every employee undertakes a summary follow-up meeting once or twice a year for evaluation and discussion.<sup>212</sup> Although one manager suggests the result focus has increased slightly as a consequence of the IPO,<sup>213</sup> consensus among other interviewees challenge this,<sup>214</sup> especially since the company for a long time has obtained funding through venture capital,<sup>215</sup> a stakeholder with equally strong financial results focus.

## Value control

One of the least formalized features of MCS in company X is value control. Although formal visions and goals are presented in the company's annual reports and on its website, the practical implications remain unclear. While the staff seems to be aware of the corporate vision and goals, conforming to and even embracing company values, the formal statements are not explicitly linked to more practical implementation. Instead, much of the value control is managed through

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<sup>203</sup> Interview CFO.

<sup>204</sup> Income Statement, Company X Annual Reports 2000 – 2009.

<sup>205</sup> Interview Director QA&Reg.

<sup>206</sup> Interviews Director QA&Reg, HR Manager, VP D&T and CFO.

<sup>207</sup> Interview VP D&T.

<sup>208</sup> Interview CFO.

<sup>209</sup> Interviews CFO, VP D&T and Director QA&Reg.

<sup>210</sup> Interview Director QA&Reg.

<sup>211</sup> Interview HR Manager.

<sup>212</sup> Interview HR Manager.

<sup>213</sup> Interview HR Manager.

<sup>214</sup> Interviews CFO, VP D&T and PM.

<sup>215</sup> See e.g. Company X Annual Reports 1997 – 2007.

input selection, i.e. recruitment of those who share the company's values. Being a company with one core business<sup>216</sup> facilitates maintaining a homogeneous workforce,<sup>217</sup> which in turn increases alignment within the company.

Furthermore, any employee that does not conform to company values is easily observed due to company size.<sup>218</sup> Since a vast majority of managers have been with the company from the start, they retain the original vision for the company,<sup>219</sup> thus enabling a quick integration of new recruitments. Several managers state the prevailing corporate culture to be highly results-oriented, but concurrently emphasizing out the importance of creating an open culture that allows mistakes.<sup>220</sup> While a substantial consequence of the IPO has been the restrictions on communicating share price-related information, resulting in more formalization and secrecy, none of the interviewees believes this has affected company culture significantly. However, one manager states that the natural development of the company's growth has changed corporate culture to, increasingly, business as usual, dampening the entrepreneurial spirit. This is, however, strongly challenged by others who claim entrepreneurial spirit remains one of the dominating company traits.<sup>221</sup> However, in recent employee surveys, the communication restrictions come across as a large adjustment for a major part of the workforce,<sup>222</sup> thus potentially affecting company culture.

## 4.2 Styles of control

### Formal and informal control

As previously stated, due to extensive regulations within the medical devices industry, all processes within any such company must be highly formalized and rigorously documented. Since these external regulations are a prerequisite for medical devices production, they have also resulted in formalized internal routines from early on.<sup>223</sup> Additionally, the company has obtained funding through venture capital since the start-up, and, according to the CFO, started to prepare for an IPO already in 2002, though financial statements are available even previous to that.<sup>224</sup> All interviewees agree that the degree of MCS formalization in general, therefore, has not changed notably as a result of the IPO. However, they also agree that there has been increased formalization in one area: distribution of financial information, as discussed above.

Notwithstanding this fact, none of them consider the lack of financial information to be of major significance in daily operations. Although the information is classified, rules can be

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<sup>216</sup> Interview CFO.

<sup>217</sup> Interviews HR Manager and CFO.

<sup>218</sup> Interview VP D&T

<sup>219</sup> Interview HR Manager.

<sup>220</sup> Interview VP D&T.

<sup>221</sup> Interviews HR Manager, Director QA&Reg and VP D&T.

<sup>222</sup> Interview HR Manager.

<sup>223</sup> Interview Director QA&Reg and VP D&T.

<sup>224</sup> Interview CFO.

slightly bent if specific data is required for a particular task.<sup>225</sup> Furthermore, in such a small company, where work desks are all in the same room, it is impossible to completely avoid overhearing purportedly classified information.<sup>226</sup>

The highly regulated and formalized structures mentioned above includes formal project guidelines for executing NPD projects, with regular meetings, steering committee reviews and formal communication procedures.<sup>227</sup> The actual decision process between each formal meeting is however somewhat more informal, based mainly on informal verbal and email communication, meetings, and casual conversations in hallways.<sup>228</sup> Consequently, a project manager speaks of a “mental preparation phase” between meetings, resulting in a clear opinion before each formal meeting.<sup>229</sup> These internal and more informal decision-making processes appear to be fundamentally unaffected by the IPO.<sup>230</sup>

### **Self-control, peer control and external control**

Being a small company with high ambitions, the atmosphere can be fairly demanding since every individual action is highly visible to both managers and colleagues.<sup>231</sup> Furthermore, as corporate visions and goals are greatly embraced by the workforce,<sup>232</sup> many feel personally responsible for job tasks as well as for the company’s success,<sup>233</sup> displaying a high degree of self-control. While this may give the individual employee a sense of freedom, one of the interviewed managers admitted it creates a lot of pressure as well.<sup>234</sup>

External control is exercised directly by enforcement from regulatory organs such as the EU, FDA and ISO, and indirectly by the financial market actors after the IPO.<sup>235</sup> For instance, one manager points to the increased focus on *the timing* of a deal rather than *whether* a deal was made, due to the pressure of presenting satisfactory quarterly reports.<sup>236</sup> The HR manager supports his view, asserting that although the company has maintained an appropriate financial reporting system from the beginning, the greater emphasis on accuracy and timeliness has increased work pressure on administrative personnel.

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<sup>225</sup> Interview HR Manager.

<sup>226</sup> Interview Director QA&Reg.

<sup>227</sup> Interview VP D&T.

<sup>228</sup> Interview PM.

<sup>229</sup> Interview PM.

<sup>230</sup> Interview PM.

<sup>231</sup> Interview VP D&T.

<sup>232</sup> Interviews Director QA&Reg, HR Manager and CFO.

<sup>233</sup> Interview HR manager.

<sup>234</sup> Interview HR manager.

<sup>235</sup> See e.g. the NASDAQ OMX Stockholm Exchange Listing Agreement regarding various surveillance bodies.

<sup>236</sup> Interview VP D&T.

## **Bureaucratic and interactive control**

The formal control aspects in company X have been on an evaluative basis traditionally.<sup>237</sup> Expected outcome descriptions are an integral part of formal project outlines,<sup>238</sup> employee follow-ups and performance evaluations are regularly scheduled,<sup>239</sup> and external control by regulatory organs follows a fixed set of policies and procedures. Incentive systems are based on reaching predetermined financial and qualitative targets rather a continuous evaluation.

Although continuous improvement initiatives have been taken recently, inspired by Toyota's lean production model,<sup>240</sup> these are in an initial concept stage rather than being implemented in practice. However, the company utilizes continuous budgets and forecasts based in regular information updates, in order to keep the control tools as accurate as possible.<sup>241</sup> Additionally, in NPD projects, information is continuously exchanged between the project team manager and the management team in the company,<sup>242</sup> and company-wide staff meetings are held to maintain an open corporate culture and inform employees of business development.<sup>243</sup>

# **5 Discussion**

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The adaption of Hales' framework not only highlights the conflicting results in literature, but also clearly indicates the limited influence of an IPO process on MCS in an innovation firm in theory. Notwithstanding the influence of an IPO on external control and formal control, no focus or style of control appears to be altered by such a process. In this discussion, comparisons between the adapted theoretical framework and the empirical case study data will indicate the framework's applicability in practice.

## **5.1 Focus of control**

### **Input control**

In the adapted framework, input control is positively associated with innovation, without being influenced by an IPO process. In company X, the homogenous academic and professional background and the low staff turnover, prior to the downsizing, indicate a careful human resource selection in order to maintain an "enthusiastic, laid-back and entrepreneurial culture."<sup>244</sup>

The size of the firm further emphasizes the relative importance of each employee, which is corroborated by the semi-formal but extensive, individually tailored, capacity building. Previous negative experiences of unexpectedly short employments demonstrate a long-term perspective

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<sup>237</sup> Interview Director QA&Reg.

<sup>238</sup> Interview Director QA&Reg.

<sup>239</sup> Interview HR Manager, Director QA&Reg.

<sup>240</sup> Interview Director QA&Reg.

<sup>241</sup> Interview Director QA&Reg.

<sup>242</sup> Interview PM.

<sup>243</sup> Interview CFO.

<sup>244</sup> Interview Director QA&Reg.



on employees, and the importance of a culture that “make[s] sure that everyone enjoys working here.”<sup>245</sup> In this case, the time, focus and resources spent on input control, in terms of personnel selection and training, is clearly both implicitly and explicitly linked to the company’s innovation processes. Furthermore, formal human resource guidelines, goal specifications or general guidelines are set by regulatory standards, and the case-by-case recruitment process and capacity building have remained unchanged throughout the IPO process. Consequently, we conclude that **our proposition regarding input control is supported by the case study data, with input control being positively associated with innovation but not influenced by an IPO.**

### **Process control**

Despite being based on contrasting research, process control in the adapted framework is generally positively associated with innovation without being influenced by an IPO process. In company X, the concept of process control focuses primarily on formal guidelines and regulations, due to the highly regulated industry of medical technology. As a result, innovation projects share common project outlines, but the actual implementation is on an ad-hoc basis.<sup>246</sup>

The potential decrease in innovativeness, caused by formalized protocols and structures, may be compensated for by an increased ability to make systematic and coordinated decisions even in the face of uncertainty.<sup>247</sup> Furthermore, the complementing process formalization and informal behavior control in company X may well constitute a combination that enhances innovative performance. Excluding the increased limitations on information distribution imposed by financial regulations, which will be discussed further on, the IPO affected no process controls highlighted in the case study. As a result, **our proposition regarding process control is supported by case study data, with process control being positively associated with innovation but not influenced by an IPO.**

### **Output control**

Perhaps somewhat surprisingly, output control in the adapted framework is not generally associated with innovation, nor is it influenced by an IPO process. The conflicting research provides several alternative perspectives on this proposition, which is to some extent reflected in the empirical findings. Although some experience a slightly greater emphasis on quarterly results after the IPO,<sup>248</sup> company X has had a strong results focus from the start. As a small, innovative company yet to reach profitability, the stringent focus on results has been imperative in securing

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<sup>245</sup> Interview Director QA&Reg.

<sup>246</sup> Interview PM.

<sup>247</sup> Poskela, 2009.

<sup>248</sup> Interview VP D&T.

long-term private equity investors, who have all remained owners after the IPO. Additionally, there seems to be a broad consensus regarding the strong results-oriented culture within the company,<sup>249</sup> with relative work freedom within the structured process outlines as long as targets are reached. Then again, intrinsically motivated employees are frequently more persistent in pursuing organizational goals,<sup>250</sup> with self-control being more important than the extrinsic rewards.<sup>251</sup>

The regular staff assessments and performance reports support the focus on output control. However, only top management is included in performance-related incentive systems, and there are few mentions of formal or informal reward systems for employees after e.g. completed projects. The focus on output control may be perpetual, but it is only moderately implemented in practice, and it has only been slightly influenced by the IPO process. Thus, lacking more comprehensive empirical findings, we conclude that **our proposition regarding output control is neither supported nor contradicted by the case study data, with an ambiguous association between output control and innovation**, and future research should explore this area further.

### Value control

In the adapted framework, value control is positively associated with innovation and not influenced by an IPO, which is generally in line with prior research. Simons highlights the importance of formal beliefs systems in creating job commitment, by providing highly educated employees with a formal sense of purpose and direction.<sup>252</sup> Company X's formal mission statement accomplishes this, in the sense that interviewees concretize the long-term goal through a comparison with the ubiquity of a medical technology device for a similar market. The rigor of input control in terms of recruitment and capacity building,<sup>253</sup> as well as the size of the company,<sup>254</sup> supports the empirical findings of consistent organizational values. As mentioned by several interviewees, all employees are driven and aware of the results focus and the need to succeed. By focusing on outcomes, allowing relative process flexibility and mistakes to be made, the corporate culture is supportive of innovation and perceived as such.<sup>255</sup> Although external events such as downsizing may have affected the firm atmosphere temporarily, the underlying informal values seem unchanged. Thus, we find **our proposition regarding value control is supported by the case study data, with value control being positively associated with innovation but not influenced by an IPO.**

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<sup>249</sup> Interview Director QA&Reg, CFO, HR Manager, VP D&T.

<sup>250</sup> Manz, 1986.

<sup>251</sup> Poskela, 2009.

<sup>252</sup> Simons, 1995.

<sup>253</sup> Ouchi, 1979.

<sup>254</sup> Chandler et al., 2000.

<sup>255</sup> Cf. Amabile, 1998.

## 5.2 Styles of control

### Formal and informal control

The conflicting research results and paradoxical interplay between formality and flexibility need to be taken into account when evaluating formal control being positively associated with innovation in the adapted framework. As we have seen, formalization or lack thereof influences most forms of control, creating a complex picture with regards to innovation. The empirical findings from the case study are of a similar kind, with formalized regulations and guidelines interchanging with informal communication channels, project implementation frames and corporate values. However, the clear focus on formalized procedures in accordance with industry regulation has created a strong sense of approval of formalized routines internally as well,<sup>256</sup> and may well create a sense of supervision and direction that increases effectiveness and success rates in development projects.<sup>257</sup> This is further supported by the early-established focus on financial reporting and routines similar to those in publicly listed companies. According to interviewees themselves, this may be associated with their background in larger pharmaceutical firms as well. And although information distribution has been considerably formalized after the IPO, it posed no significant difficulty or influence on the daily business and activities. One reason is the limited applicability of financial and market information on the day-to-day product development work, another the physical proximity and open workplace landscape at the office enabling informal communication in practice when necessitated. In other words, the formalized information distribution may have affected the work atmosphere, but not the innovation work itself. Considering this, Poskela's unequivocal conclusions of informal communication being unassociated and process formalization being positively associated with innovation, matches the company's degree and view of formalization.<sup>258</sup> Consequently, despite the generally acknowledged view of increased formalization as a result of an IPO, **our proposition regarding formal and informal control is partially supported by case study data: formalization is positively associated with innovation, but influenced by an IPO merely in terms of information distribution.**

### Self-control, peer control and external control

When discussing these styles of control, the commonalities between the different styles should be kept in mind. In the adapted framework, self-control, peer control and external control are positively associated with innovation, whereas only external control is influenced by an IPO due to the increased regulatory demands on publicly listed companies.<sup>259</sup> All interviewees, not only

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<sup>256</sup> Intervju Director QA&Reg.

<sup>257</sup> See e.g. Takikonda & Rosenthal, 2000.

<sup>258</sup> Poskela, 2009.

<sup>259</sup> Merchant, 1982.

those working directly with product development, were aware of and felt motivated by the firm's innovation potential, suggesting a consistently present sense of self-control.<sup>260</sup> Moreover, professional freedom and, thus, high levels of self-control are explicitly supported in company X, augmenting the high intrinsic motivation observed in the empirical findings. The strong project focus and the preference for an iterative process – especially in the light of the company's Japanese partners<sup>261</sup> – requires not only high self-control, but also high levels of peer control in order to stay on target and achieve successful product development. The homogenous company culture and significant employment history of key personnel further enhances the level of peer control present in the company.

External control consists of both personal and impersonal control, with both present in company X, similar to a majority of companies. In company X, rules, standards and regular personal management has been present almost from the start, due to both early investment from private equity firms and preliminary adjustments in preparation for a future IPO.<sup>262</sup> However, the IPO process has introduced the financial markets and the actors therein as new stakeholders of the company, a class that includes analysts, institutional investors, banks and in some cases, the media. Research indicates the increased external pressure after an IPO does influence innovation, although the net effect may be contingent on circumstances in individual cases.<sup>263</sup> In Company X's case, the increased external control following the IPO process, as well as the subsequent formalization and limitation of information distribution, serve as examples that may implicitly impact the long-term innovativeness of the company. Consequently, **our propositions regarding self-control, peer control and external control are supported to a large extent: self-control and peer control are positively associated with innovation and uninfluenced by the IPO, whereas external control is influenced by the IPO, but undecided whether it is positively or negatively associated with innovation.**

### **Bureaucratic and interactive control**

The complementing, rather than contrasting, relation between bureaucratic and interactive control suggested by Poskela has been taken into account in the adapted framework, where both styles of control are positively associated with innovation and not influenced by an IPO. Furthermore, the discussion below partially overlaps the previous examination of formal and informal controls, although the two sets of styles are not entirely synonymous.

Bureaucratic control, structured as diagnostic control systems in Simons' framework, are formal information systems used to monitor organizational outcomes. Interactive control systems on the other hand focus on strategic uncertainties and renewal, through managers using formal

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<sup>260</sup> Interview HR Manager.

<sup>261</sup> Interview PM.

<sup>262</sup> Interview CFO.

<sup>263</sup> Wu, 2006.

information systems to involve themselves in their employees' work activities.<sup>264</sup> In that sense, both styles of control are comprehensively applied in company X. All communication systems involve a one-way diagnostic aspect based on performance evaluation and outcome analysis, as well as an interactive aspect based on dialogue, feedback and collective problem solving.<sup>265</sup>

Furthermore, top management receives flexible compensation based on revenues, cost targets and results from employee satisfaction surveys.<sup>266</sup> The level of internal and external bureaucratic control indicates the effectiveness of these systems, supporting Ylinen's findings regarding diagnostic control systems being positively associated with administrative type development projects.<sup>267</sup> As communication and control within projects are largely on a day-to-day basis with room for flexibility and customization, continuous fine-tuning in joint projects both vertically and across firm boundaries, interactive control is clearly applied in the product development process. Also these empirical findings are supportive of Ylinen's conclusions regarding interactive control systems being positively associated with technological type development projects. Finally, while changes may have been implemented in the course of the firm's natural life cycle,<sup>268</sup> the IPO process' lack of influence on these styles of control strengthens Trostel and Nichols' conclusions regarding the lack of differences in managerial participation between publicly- and privately-held firms. In conclusion, **our propositions regarding bureaucratic and interactive control are supported by the case data, with both styles of control being positively associated with innovation but not influenced by an IPO.**

## 6 Concluding remarks

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### 6.1 Validity and reliability

We have aimed to provide an introductory case study that offers a broad theoretical foundation for future findings. Despite our efforts to secure valid and reliable data, we recognize validity as a particular challenge to our study in this complex and relatively uncharted research area. A more thorough investigation of this is presented below.

Given the exploratory nature of our research, concurrent with the other characteristics outlined in chapter 2.1, we believe our choice of method – the case study – to be the most relevant, and neither particularly detrimental to validity nor significantly different from similar findings based on case studies. As discussed in chapter 2.1, the hypothetical-deductive approach may not be the most commonly applied to a qualitative study; however, there is no academic

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<sup>264</sup> Simons, 1995.

<sup>265</sup> Simons, 1995.

<sup>266</sup> Interviews CFO, Director QA&REG.

<sup>267</sup> Ylinen, 2004.

<sup>268</sup> Cf. Moores & Yuen, 2001.

consensus regarding it being inappropriate for qualitative studies. Thus, we believe our choice to be fairly uncontroversial and, moreover, most suitable for this particular study with its two-fold purpose, which adds to the study's reliability.

By adapting an existing framework to include multiple and contrasting views, subsequently analyzing the empirical findings within this theoretical context, this study aims to reach the second inference level, adding to its reliability. A challenge to securing validity is naturally the crucial search for relevant literature, where the limited time frame and resource allowance for this thesis adds to the difficulty of making an exhaustive literature search, potentially negatively affecting the theoretical relevance.

By designing our case study according to the procedures outlined by Yin, we consider reasonable reliability has been obtained. The absence of statistically significant figures and variables prevalent in quantitative study designs are balanced by the merging of two analysis strategies.

Out of the over 300 companies publicly traded on the NASDAQ OMX Stockholm exchange, our specific criteria resulted in the choice of a single case study subject, company X. Despite the scarcity of suitable firms at the OMX, the chosen company fit the criteria well, thereby increasing the validity of this study. However, limited access to company X – mostly in terms of accessing classified documentation – may have affected the information gathering in a negative way, and thus somewhat decreased the reliability, mainly due to lack of thorough triangulation of multiple data sources.

Despite the potential bias in any data collection process, we don't consider our choice of data collection measures – i.e. semi-formalized interviews with open-ended questions – to be detrimental to our purposes. Instead, we hope to have improved validity by the extensive literature research and preparation of questions beforehand. Since we have met all interviewees in person, we also have a feel for their ways of expressing themselves; thus we are able to allow for this without considerable bias to our data. Notwithstanding the issues concerning limited access mentioned above, we consider reasonable reliability to have been secured in the overall data gathering.

## **6.2 Implications and suggested future research**

The major limitations of this thesis owe mainly to the lack of relevant previous research as a theoretical foundation. Because of this, combined with the inherent limitations of a qualitative case study, we have aimed only to draw tentative conclusions regarding the overall applicability of our findings. Consequently, there is need for more research in this field; more in-depth qualitative case studies, perhaps only focusing on one area of management control to maximize the advantages of a qualitative approach, as well as quantitative survey studies to defend the general applicability of future findings. The results presented in our study suggest, somewhat

surprisingly, that hardly any MCS is affected by an IPO. Although this result was supported empirically, it contradicts previous research in this area to some extent, limiting the general applicability of our findings. The specific settings in our study, which may have affected this, are discussed below.

First of all, the specific characteristics of company X need to be considered. As evident in the empirical description, company X is a fairly small, young firm, and has been aiming for an IPO from the start-up. It may well be the case that, when applying the methods and frameworks used in this study on 1) a larger company, where well established MCS may be more significant, 2) a more mature company where internal MCS has thrived without significant external influence, or 3) a company without initial intention of IPO, where MCS may be very informal, completely different results are obtained. It is also possible that the nature of company X's IPO process affects our results. The fact that company X has been controlled by external investors prior to the IPO, with maintained owner structure post-IPO, may decrease the effect of the public listing on MCS from a legitimization or agency cost perspective, none of which were within the scope of this study. Notwithstanding this, formal regulations associated with an IPO still apply; however, these are small, and depend largely on the industry in which the company operates. The industry in which company X operates requires extensive formalization of procedures and processes, regardless of the company being privately or publicly held, presumably decreasing the formalization associated with an IPO.

Secondly, concepts and definitions used in our thesis may have biased the results. It would be interesting to investigate whether our conclusions are affected by e.g. our definitions of key concepts such as innovation and MCS. For instance, we have largely relied on the traditional view of MCS as tools for securing goal congruence; however it has been suggested that MCS are essentially information tools for uncertainty reduction.<sup>269</sup> In the context of our findings - i.e. the influence of an IPO on information distribution in company X - the implications for innovation (that essentially equals dealing with uncertainty according to some authors) resulting from this other view of MCS are well worth exploring. In addition, the concept of IPOs can be further elaborated with, e.g. to include the process of change in MCS in preparation for the IPO, at least three years prior to the actual floating (since this is the time frame required for appropriate financial statements prior to the IPO).

Third, we need to consider the possibility that our findings are, indeed, generally applicable, and a firm's MCS remains the same after an IPO. In fact, it may be the case that any company mature enough to undertake an IPO has reached the stage in its natural life cycle development where it has established formalized MCS. Essentially, this would imply that the causality is reversed compared to previous beliefs, with established and formalized MCS being

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<sup>269</sup> Davila 2000

endogenous to any firm undertaking an IPO. Although this is plausible since a firm undertaking an IPO has to focus on exploiting existing products, as opposed to remaining in a purely explorative research phase, it seems highly unlikely that this should be the general case for all companies. However, the issue of reversed causality should not be entirely dismissed, and thus calls for further research.

The propositions posed in the adapted framework were largely supported by the empirical findings. Due to the limitations of our research methods, only tentative conclusions were drawn; more importantly, they highlight topics of further interest in this unexplored area of research.

### **6.3 Summary**

Effective management control in an innovation firm has in academic literature traditionally entailed less formalization and greater employee autonomy. However, the growth and expansion of a successful innovation firm typically requires substantial amounts of capital to sustain research and business development, frequently through private equity investors initially and through an initial public offering further on. An IPO usually encompasses more than an increase in funding and liquidity, often resulting in significant internal organizational changes in order to comply with the increased external regulations and demands from new stakeholders. These changes have been commonly associated with increasing formalization, bureaucracy and decreased management flexibility, and perceived as a restrictive interdependence between financing and innovation.

However, more contemporary research suggests a more complex picture of suitable MCS for innovation, where both formalization and increased control are positively associated with new project development, research and different types of innovation, raising questions on the established view on the assumed conflict within the field of management control and innovation. Thus, the objective of this study has been to explore whether the management control system of an innovative firm is influenced by an initial public offering, comparing and contrasting empirical case study data from an innovation firm with an adapted theoretical framework based on a comprehensive literature analysis. In the adapted framework, we presented seven propositions regarding different aspects of control using Hales' theoretical structure: in terms of focus of control input, process and value control were positively associated with innovation but not influenced by an IPO, whereas output control was not associated with innovation or influenced by an IPO. All styles of control, except informal, were positively associated with innovation, with only external control being influenced by an IPO.

In our analysis of the case study data, we found our propositions empirically supported to a large extent. Exceptions included output control, formal and informal control together with self, peer and external control, where propositions were neither supported nor contradicted or partially



supported. Given the limitations and the exploratory purposes of this study, we believe our conclusions are a solid starting point for further research in this field.

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## Interviews

2010-03-30 Chief Financial Officer

2010-04-09 Vice-President Development & Technical Operations

2010-04-12 Human Resources Manager

2010-04-30 Project Manager

2010-05-06 Director Quality Assurance & Regulatory Affairs

# Appendices

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## Appendix A: Interviews

*We conducted open-ended question interviews with five managers within the studied company. Due to the informal nature of our interview sessions, information not specifically asked for may have emerged from the discussions. If so, it will be included in the empirical description in the thesis, if relevant towards reaching our conclusions. However, this does not mean we will edit our original interview questions as shown below.*

### **Interview 1: the Chief Financial Officer (CFO)**

*Aim: to obtain overall information about the internal structure and values of the company, its current development projects, underlying reasons for IPO and implications.*

- 1) **Organization and own role.** Describe the organizational structure, and your role within this. Functions and responsibilities.
- 2) **Previous experiences.** Briefly touch upon your own history in the company as well as previous experiences. What differences do you see in your company (fairly small) compared to a larger corporation in the same industry (if among previous employers), 1) overall and 2) specifically concerning the importance of informal relations with superiors and peers?
- 3) **Formal meetings.** How much of your time do you spend in formal meetings? How often do the various groups meet, e.g. management board, functional teams?
- 4) **Current development projects.** How are these managed regarding structure and governance? How are controlling functions assembled? How often will the project manager have to report, to whom and in what form?
- 5) **IPO reasons.** Discuss the reasons and logic behind the recent IPO. What was your primary objective in going public?
- 6) **IPO implications for MCS.** Have there been any changes in the company's formal MCS structures? Have you noticed any changes in actual behavior? Have you noticed any changes in the parameters legitimization, time pressure, result orientation or information flows?
- 7) **Company culture.** In your opinion, what is the main characteristic of the company when it comes to internal culture? Do you believe employees are aware of corporate visions and goals? Do you believe they are aligned to these goals? How do you communicate company values to employees?
- 8) **Innovation.** In your view, what is the single most important feature for a company in order to promote innovation? What other factors are important in this respect?
- 9) **IPO changes.** In your view, what has been the single most obvious internal change due to the IPO? What other factors are important in this respect?

### **Interview 2: the Vice President Development and Technical Operations (VP D&T)**

*Aim: to provide a more detailed review of NPD projects, specifically concerning governance of project teams, reporting procedures, performance target setting and evaluation, implications from the IPO.*

- 1) **Own role.** Describe your own role within the company structure. Functions and responsibilities.

- 2) **Previous experiences.** Briefly touch upon your own history in the company as well as previous experiences. Do you see any differences in your company (fairly small) compared to a larger corporation in the same industry (if among previous employers), 1) overall and 2) specifically concerning the importance of informal relations with superiors and peers?
- 3) **Phases in NPD projects.** As concretely as possible, outline the different phases of an NPD project in the company. Where is it initiated, and by whom? What criteria for the project plan have to be fulfilled to secure approval, who sets these criteria, and who approves the plan?
- 4) **NPD structure.** Within the context of your organization, what is the position of the project group? How many are included? Are teams cross-functional or from the same professional area?
- 5) **Evaluation of NPD projects.** How are NPD projects evaluated? Who sets targets (and on what parameters), who evaluates, and what incentive systems are used (what are the rewards)? Are projects evaluated continuously, if so; how often, on what parameters and by whom?
- 6) **Formal requirements.** What are the formal requirements for documentation, procedures and processes, when it comes to NPD proceedings? Are these mainly initiated internally or externally?
- 7) **IPO implications for MCS.** Have there been any changes in the company's formal MCS structures? Have you noticed any changes in actual behavior? Have you noticed any changes in the parameters legitimization, time pressure, result orientation or information flows?
- 8) **Company culture.** In your opinion, what is the main characteristic of the company when it comes to internal culture? Do you believe employees are aware of corporate visions and goals? Do you believe they are aligned to these goals? How do you communicate company values to employees?
- 9) **Innovation.** In your view, what is the single most important feature for a company in order to promote innovation? What other factors are important in this respect?
- 10) **IPO changes.** In your view, what has been the single most obvious internal change due to the IPO? What other factors are important in this respect?

### **Interview 3: the Human Resources Manager (HR)**

*Aim: to gain more knowledge regarding the recruitment process, employee alignment and overall company values, implications from the IPO.*

- 1) **Own role.** Describe your own role within the company structure. Functions and responsibilities.
- 2) **Previous experiences.** Briefly touch upon your own history in the company as well as previous experiences. Do you see any differences in your company (fairly small) compared to a larger corporation in the same industry (if among previous employers), 1) overall and 2) specifically concerning the importance of informal relations with superiors and peers?
- 3) **Recruitment procedures.** As concretely and exhaustively as possible, describe the recruitment process. Are the procedures always the same? Who takes decisions?
- 4) **Personnel characteristics.** What criteria do you use as evaluation of aspiring employee: factual knowledge, personality etc? Set by whom? Do they differ depending on position, if so: in what way?



- 5) **Introduction.** How is the new employee introduced to the company? Are there any formal introduction schemes? Any informal introduction e.g. welcoming party?
- 6) **Individual competence/capacity building.** How do you ensure continuous enhancement of skills/individual competence development? Are there any fixed numbers e.g. education hours per employee per year or similar?
- 7) **Evaluation.** How are personnel evaluated? What targets, evaluation procedures, and by whom? How often?
- 8) **Company culture.** In your opinion, what is the main characteristic of the company when it comes to internal culture? Do you believe employees are aware of corporate visions and goals? Do you believe they are aligned to these goals? How do you communicate company values to employees?
- 9) **Innovation.** In your view, what is the single most important feature for a company in order to promote innovation? What other factors are important in this respect?
- 10) **IPO changes.** In your view, what has been the single most obvious internal change due to the IPO? What other factors are important in this respect?

#### **Interview 4: the Director Quality Assurance and Regulatory Affairs (QA&Reg)**

*Aim: to become more acquainted with the external requirements for MCS relevant for the company, further insight into top management procedures, implications from IPO.*

- 1) **Own role.** Describe your own role within the company structure. Functions and responsibilities.
- 2) **Previous experiences.** Briefly touch upon your own history in the company as well as previous experiences. Do you see any differences in your company (fairly small) compared to a larger corporation in the same industry (if among previous employers), 1) overall and 2) specifically concerning the importance of informal relations with superiors and peers?
- 3) **Formal external demands.** What external regulations demand compliance, and what are the implications for the internal MCS? What about documentation, processes, technical specifications? To what extent is informal behavior, e.g. in decision-making accepted?
- 4) **Performance targets.** What are your performance targets? How are these set, and by whom? On what basis? Of what character are they? How are they evaluated, and how often?
- 5) **Incentive systems.** What are your incentive systems in the context of outcome rewarding? Are there any differences between management and regular employees in this matter? Who sets the targets, and who evaluates?
- 6) **Company culture.** In your opinion, what is the main characteristic of the company when it comes to internal culture? Do you believe employees are aware of corporate visions and goals? Do you believe they are aligned to these goals? How do you communicate company values to employees?
- 7) **Innovation.** In your view, what is the single most important feature for a company in order to promote innovation? What other factors are important in this respect?
- 8) **IPO changes.** In your view, what has been the single most obvious internal change due to the IPO? What other factors are important in this respect?

#### **Interview 5: NPD Project Manager (PM)**

*Aim: to get further insight in the NPD project: procedures, team assembly, decision making, reporting structures, implications from IPO.*

- 1) **Own role.** Describe your own role within the company structure. Functions and responsibilities.
- 2) **Previous experiences.** Briefly touch upon your own history in the company as well as previous experiences. Do you see any differences in your company (fairly small) compared to a larger corporation in the same industry (if among previous employers), 1) overall and 2) specifically concerning the importance of informal relations with superiors and peers?
- 3) **Project personnel recruitment.** Who selects project team personnel, and based on what criteria? What functions are included in your team (i.e. only technicians, or cross-functional competences)?
- 4) **Project organization.** What is the position of your project in a broader organizational context? What are the internal structures: formalized roles and communications flow/loosely coupled networks etc?
- 5) **Reporting and evaluation I.** How often do the members of your team report to you? How formal are there reports?
- 6) **Reporting and evaluation II.** Who do you report to, and how often? What type of reports do you do/what form? On what parameters are you evaluated e.g. product success among customers, high technical level, well aligned with external regulations?
- 7) **Company culture.** In your opinion, what is the main characteristic of the company when it comes to internal culture? Do you believe employees are aware of corporate visions and goals? Do you believe they are aligned to these goals? How do you communicate company values to employees?
- 8) **Innovation.** In your view, what is the single most important feature for a company in order to promote innovation? What other factors are important in this respect?
- 9) **IPO changes.** In your view, what has been the single most obvious internal change due to the IPO? What other factors are important in this respect?

## Appendix B: Tables

	Perfect knowledge of transformation process	Imperfect knowledge of transformation process
High availability of output measures	e.g. tin can plant	e.g. life insurance agency
Low availability of output measures	e.g. double play combination	e.g. foreign service

Table 1: Ouchi's (1977) example: (suggested corresponding control type excluded)

	Routine: <b>few</b> exceptions	Non-routine: <b>many</b> exceptions
Unanalyzable problems ( <b>low</b> task analyzability)	Craft industries (e.g. specialty glass)	Non-routine (e.g. aerospace)
Analyzable problems ( <b>high</b> task analyzability)	Routine (e.g. tonnage steel mills, screws and bolts)	Engineering (e.g. heavy machinery)

Table 2: Perrow's (1967) example: technology variable (industrial example)