

**THE HYBRIDIZATION OF LEAN PRODUCTION:
THE CASE OF JAPANESE SUBSIDIARIES IN THE
POLISH AUTO MANUFACTURING INDUSTRY**

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ABSTRACT

This research addresses the transfer of the Japanese management system (JMS) to subsidiaries in the Polish auto manufacturing industry. Significant attention is given in various literatures to the concept of lean production and its basis within the JMS. An important research focus is the transfer of lean production principles to economies beyond Japan. This thesis contributes to an understanding of the transfer process with reference to Japanese direct investment in Poland. Conceptually, hybridization is elaborated within the evolutionary theory of the firm. Empirically, three measures of hybridization are developed with respect to Japanese subsidiaries in Poland. Information is drawn from interviews with managers to reveal actual management practices. These are compared to existing models of lean production and the JMS. Analysis reveals that the four case studies represent different types of hybrids. An underlying concern is whether evolving forms of the Japanese management system are appropriate for development of Poland.

DEDICATION

I dedicate this thesis to Tracy. Without your enduring support, emotional and financial, as well as your constant encouragement, this experience would not have been possible.

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CHAPTER 1: INTRODUCTION

The successes enjoyed by Japanese manufacturers in various industries and the resulting expansion of exports and direct foreign investment (DFI) from Japan since the 1980s has fuelled a debate about the source of their competitive strength. A key research question in many disciplines, stimulated by Womack's (1990) famous study, is the extent to which the nature of Japanese strengths can be transferred to other economies. For Womack the competitive strength of the Japanese firms lies in their system of *lean production*. The assumption of their study is that the basic principles of lean production can be transferred to other economies. Womack's position rejects the idea that lean production is rooted in unique Japanese cultural belief patterns that are difficult to emulate abroad. Recently however, there has been a recent recognition in various disciplines (Abo, 1994; Boyer *et al.*, 1998, 2002; Fruin, 1992; Itagaki, 1997) that lean production in Japan is embedded in distinct domestic institutions and society. In this competing view, the transfer of lean production is less straightforward than envisioned by Womack. Indeed, in the competing view, the transfer of lean production beyond Japan involves the "hybridization" of Japanese strengths as these become modified when placed in a foreign environment. This thesis addresses this concept of hybridization with specific reference to Japanese subsidiaries in the Polish auto industry.

This introductory chapter unfolds in five main parts. The first section defines the concept of lean production and elaborates the nature of Japanese strengths, or competencies in the manufacturing industry. Second, the institutional structure of the Japanese management system is reviewed. Third, research literature within economic geography and other disciplines is noted and classified. Next, the research objectives section delineates the gaps in these bodies of literature and identifies questions to be explored in this thesis. Finally, research methodology is presented along with information on the firms that form the basis for the empirical component of this project.

1.1 BASICS OF LEAN PRODUCTION

With the success of Japanese branch plants since the 1980s, a general consensus emerged that the competitive strength of Japanese firms rested with the disciplined implementation of a set of policies and practices that govern the day to day operations on the shop-floor, or what the Japanese call the production system (Aoki & Dore, 1994; Fruin, 1992; Liker et al., 1999). This set of practices specific to the shop-floor has been defined as “lean production” and promoted as a universally applicable best practice for the manufacturing sector worldwide. This view was made famous with the release of Womack’s book entitled *The Machine that Changed the World* (Womack, 1990). This analysis of Japanese firms and the world motor vehicle manufacturing industry is perhaps the most cited study of lean production. Within it they define lean production as a way of organizing manufacturing activity with the primary purpose of eliminating waste from the production process. This is accomplished through the elimination of any activity that uses resources but produces no value, including manufacturing mistakes that require rectification, surplus or shortage in inventory, superfluous processing steps, unnecessary movement of goods or people, as well as products which fail to meet customer expectations. Womack summarized these types of activities in world-class Japanese firms as “lean production”. The specific set of procedures they describe involves: specifying value, identifying the stream of value, rearranging value flows, using pull forces, and striving for perfection (Womack, 1990). The first procedure, specifying value, means looking at the pricing of manufactured products and asking how much of that cost is attributed to waste in the production system. If this waste can be eliminated, the product can be offered at a lower price. The second procedure, identifying the value stream, involves finding steps in the production process that are unnecessary and create no value. The third procedure, rearranging value flows, means reducing batch processing and de-emphasizing radical innovation, by focusing on small-lot production and continuous incremental improvement. This implies integrating steps in the production process rather than separating them into separate departments. The fourth procedure, using pull forces, is about producing parts only when they are demanded by downstream steps in the production process, and then producing them quickly. The final step, striving for perfection, means integrating the previous four procedures in a self-perpetuating cycle of

waste reduction. This approach requires transparency in all steps in the production process, whereby improvements in one step reveal possibilities for optimization elsewhere, in a cyclical process that fuels continual reduction of wastes.

Womack argues that this process of continual waste reduction, which is central to lean production, is beneficial for both company and workers. In this view lean production a) enhances competitive advantage and b) cuts *wastes* that reduces the need to cut *cost* in the form of jobs when the factory falls on hard times. For Womack, lean work is also inherently more challenging than traditional mass production since workers experience greater mental stimulation and exercise greater judgement in performing their tasks – searching for waste stimulates problem solving activity. Accordingly, in this light lean production is a socially *and* economically superior way to make things and represents a universal best practice for the manufacturing industry.

The criticisms of lean production are primarily concerned with labour related implications. Thus critics see lean production as production efficiency attained only through management by stress (Babson *et al.*, 1995). From this perspective, lean production externalizes waste beyond the production system and beyond the firm itself and is therefore associated with significant social costs. For example, long overtime and intense competition place strain on mental and physical health, and workers are forced to bear these burdens because the social and material penalties for changing jobs are high in Japanese society. With such examples critics of lean production draw attention to an important issue, namely that lean production is very much shaped by the surrounding institutional context.

1.2 THE JAPANESE MANAGEMENT SYSTEM

In a pioneering work, Liker et al (1999) argue that the set of procedures collectively defined as “lean production” by Womack and others is actually not evidenced in many highly successful Japanese manufacturing firms. Seemingly, the procedures embodied in lean production alone cannot account for the competitiveness of the Japanese firm. Therefore, Liker et al characterize lean production as a mere component of a larger layered model of what they term the Japanese management system

(JMS). This model is much like a tiered wedding cake where each layer represents sets of practices and procedures common to successful Japanese manufacturing firms. In this model the layers are functionally integrated and each layer is supported by the one below it (Liker et al., 1999, p.7) . The top layer of this cake is the shop-floor production system, which more or less corresponds with Womack's characterization of lean production. Below this core layer are three more layers: the factory management layer, the corporate layer, and the institutional context layer. The factory layer includes human resource practices, supplier relations, and learning processes. Liker et al assert that these buttress the shop-floor production system (lean production). The corporate layer includes union structures outside the factory, R&D strategy, and the relation of the firm to capital markets and the supply chain. The shop-floor, factory management, and corporate layers are all in turn embedded in the institutional layer which includes the regulatory environment, the education system, and cultural values evidenced in Japan¹.

This embedded or stacked-layer Japanese management system (JMS) model provides recognition that the institutional context of Japan plays an important role in lean production. Perhaps the debate between Womack and the critics regarding the exact source of Japanese competitiveness is not yet resolved. However, if lean production is indeed embedded within the Japanese institutional context to any extent, then the transfer of lean production as a universal best practice may not be as straightforward as envisioned by Womack. In such a case, the economic geography of regions becomes extremely important with respect to the Japanese firm abroad.

1.3 THE JAPANESE FIRM ABROAD

There have been a wide variety of approaches across various disciplines to understand the spread of the Japanese firm around the world since the 1970s (including Abo, 1994; Alston, 1986; Beamish *et al.*, 2001; Beechler & Bird, 1999; Drache & Daniel, 1994; Humphrey *et al.*, 2000; Kaplinsky & Posthuma, 1994; Rutherford, 2001; Xiaochen, 2001). Geographers have themselves made significant contributions to the understanding of the Japanese firm in the global economy. For example, Florida and Kenney explore

¹ A detailed account of the layers of the JMS is presented in chapter three

the globalization of research and development efforts by Japanese industry, and the globalization strategies of Japanese firms, as well as the determinants of the location of Japanese facilities in the United States (Florida & Kenney, 1994). Similarly, Sadler looks at the changes in locational patterns of supplier activity with the entry of Japanese just-in-time practices in Western Europe (Sadler, 1994). In another account, Mair elaborates on the modification of Japanese enterprise systems to local circumstances, with reference to the Honda corporation in the US (Mair, 1992, 1994). Edgington explores the influences on the location and behaviour of Japanese transnationals in the context of Australia and North America, emphasizing the role of corporate strategy (Edgington, 1987, 1990; Edgington & Hayter, 1997).

However, while an extensive and relevant literature exists that shows some overlap with studies of the Japanese enterprise in other disciplines, in geography comparatively little emphasis is given to the Japanese management system (JMS) beyond an inquiry into corporate strategy. In practice, the JMS has largely been the preserve of international business and engineering management literatures. It is therefore important to look beyond economic geography to these other disciplines in a review of JMS literature. In this regard, Liker *et al.* usefully suggest three main perspectives define the breath of the Japanese management system literature: 1) the innovation diffusion perspective, 2) the “structuralist” perspective, and 3) the emergent process perspective (Liker et al., 1999). Their review of the literature, it might be noted, does not incorporate the aforementioned economic geography literature.

From the innovation diffusion perspective, transfer of a management system, like any technological or social innovation is dependent on the difference between sender and receiver, on the mode by which transfer occurs, and on the nature of the innovation itself (Rogers, 1983, 2003). The size, flexibility, and resources available to the adopter/receiver play an important role in determining the success of innovation implementation (for example I. Nonaka & Nishiguchi, 2001). As demonstrated by the case of Japanese multinational corporations (MNCs) in the electronics sector, the commitment and resources of the sender are just as important (Kenney & Florida, 1993). In addition to sender and receiver characteristics, the method by which practice is transferred, for example, through printed manuals, transfer of personnel from Japan, or

benchmarking between home and a branch plant, determines the outcomes of the transfer process. Finally, the attributes of the JMS itself, including its perceived relative advantage gain, its compatibility with existing practice, and its level of complexity are important. Liker contends that from the innovation diffusion perspective, social context is best left in the background because it represents a set of amorphous factors that may affect the diffusion of the Japanese management system but are difficult to define. The significance of context is therefore left to surface indirectly through the characteristics of the sender and receiver of the Japanese management system. In this diffusion perspective, lean production is seen as a universally superior set of principles that is transferred as “best practice” without modification. However, a growing body of literature refutes this possibility and shows that lean production is modified whenever it is adopted abroad (for example Itagaki, 1997; Rutherford *et al.*, 2001). Mainly, this reflects recognition that transferring lean production is not a straightforward diffusion process.

In recognition of such a view, Liker et al. identify a “structuralist” perspective which gives explanatory power to locational *context* and how it affects the transfer of the JMS beyond Japan. This perspective explains the factors influencing the transfer of lean production at four theoretical levels. At the highest level, forces of *global competition* put pressure on firms to adopt the most efficient model of productive organization. The superior efficiency of lean production as described by Womack may lend the system to unmodified diffusion. At a more concrete level, the position of a branch plant within the *international division of labour* may be important in determining the outcomes of the transfer. Here, the diffusion process is governed by the parent-subsidiary relations evidenced in branch-plant operations. After all, a branch-plant may be a truncated operation that does not require all the elements of the JMS to function. At the level of *regional or national institutional context*, management legacies, culture, education systems broadly defined, laws, and general business environment are important factors (Thomas, 1998). Elements of the JMS, such as the wage and incentive system, may be unnecessary in the absence of full employment. Finally, at the levels of the *specific firm or factory*, idiosyncratic forces like site-specific histories impact the outcome of the transfer process. At this level, the JMS may be constrained by existing arrangements in

the case of brown-field investment. As an example, two Toyota Motor Corporation assembly plants in the United States demonstrate different management systems (Koike, 1998). While the broader level forces that determine the success of transfer were the same for both plants, the difference between green field and brown field investments at the local level culminated in different outcomes (Lee, 2003). This “structuralist” perspective therefore offers insight into the limits on the transfer process but is limited in what it can offer with respect to the embeddedness of lean production within Japan.

Remedying this deficiency is a third perspective on the spread of the JMS. This *emergent process* perspective is to some extent based on the resource-based and evolutionary view of the firm (see for example Kogut & Zander, 1996, 2003a; Penrose & Slater, 1980; Wernerfelt, 1984) and emphasizes that the JMS evolved through a complex, *embedded* learning process that is continually modifying itself, rather than through pure design. The tacit knowledge that buttresses the shop-floor production system, and the institutions that structure the factory and corporate layers of the JMS, define the developmental trajectory for the system (Liker et al., 1999). This development trajectory is considered embedded, evolving and path dependent, and the JMS is the result of *ex-post* learning as much as of deliberate design. Others illustrate this point in the claim that the JMS is hybrid of US mass production system and Japanese institutional context (see for example Abegglen, 1958; Sako, 1999; Udagawa, 1995). The tacit nature of the JMS means that context will *transform* rather than just adapt elements of the Japanese management system. The results of hybridization will therefore be subject to learning and cognitive processes as much as the structural elements of the host context.

While the three perspectives identified by Liker differ in their conceptualization of the forces determining hybridization, all three recognize that hybridization is a complex process effecting the diffusion of the Japanese management system. They are therefore not mutually exclusive approaches and are in some ways complementary. The emergent process perspective usefully speaks to recent speculation regarding the relationship between adaptation of the JMS and its performance. In this view, Abo (1994) suggests that the hybridization process is detrimental to the performance of the Japanese management system because any adapted element compromises the integrity of a system designed to work in the context of Japan (Abo, 1994). Presumably, adaptation

may also improve the performance of the JMS. In this view, the “tacitness” of the JMS is derived from and indeed *defined* by local circumstances. As complements to one another, the innovation diffusion and “structuralist” perspectives reveal the structural determinants of the hybridization outcomes. In essence, they explain why particular practices are evidenced in particular Japanese branch plants by looking at elements at the various levels of a host context, such as the effects of the division of labour, regional institutions, and site specific factors such as infrastructure. The emergent process perspective in turn emphasizes the evolutionary nature of actual practices and the impact of this evolution on the performance of the system. These literatures offers useful insights into the evolution of the Japanese enterprise overseas. Hybridization as a concept however is not systematically explored and it is noteworthy that it has not been incorporated within recent advances in the theory of the firm. In addition, the contributions of economic geography in understanding the role of regional institutions in shaping hybridization have not been recognized.

1.4 RESEARCH OBJECTIVES

Studies of the hybridization of the Japanese management system to date have been limited in several respects. First, while economic geographers have explored issues of the local impacts of Japanese investment, income and employment multipliers, or adaptation of supplier systems to local circumstances, they have not explicitly addressed the Japanese management system. Accordingly, there is a need to contribute towards an explanation of hybridization explicitly within a framework of economic geography. Second, the majority of studies in disciplines other than geography have by and large focused on the regions of the United States, East Asia, and The United Kingdom. Furthermore, the theoretical interpretation of the concept of hybridization to date has been derived almost exclusively from studies conducted in the United States, and little is known about Japanese firms in the transition economies of Central and Eastern Europe in particular. Third, existing studies assume that the adaptation of Japanese management systems to local circumstances is detrimental to the performance of the firms, even though there is little conclusive evidence on this matter. Finally, existing studies have largely failed to address whether the resulting hybrid management systems evidenced in

branch plants are appropriate to the long run development of their host economies – after all, if the system is adapted to the host region, it is not receiving the same “lean production” as possessed by firms in Japan.

To contribute towards filling these gaps in the existing body of literature this study examines Japanese subsidiaries in Poland. My objective is to contribute to a better understanding of the hybridization of the Japanese management system from the perspective of economic geography. The study has two main research objectives:

- A. To conceptually elaborate the meaning of “hybridization” in the context of DFI, and in explicit relation to the evolutionary theory of the firm;
- B. To empirically examine the process of hybridization with specific reference to Japanese subsidiaries in Poland.

This latter research objective can be further disaggregated:

1. What are the characteristics of the production systems of Japanese auto manufacturing firms (subsidiaries) in Poland?
2. How do these characteristics compare to what is known about lean production and the JMS in Japan?
3. Are the differences (if any) between subsidiaries in Poland and firms in Japan, caused by adaptation to conditions in a transition economy?
4. Are hybrid production systems indeed emerging, and if so, are these successful in terms of performance?
5. Are the evidenced hybrid competencies (if any) appropriate for the long-run development of the transition economy of Poland?

These questions will be operationalized through a case study methodology based on interviews conducted with Japanese subsidiaries in the Polish auto manufacturing industry.

1.4.1 Case Study Method

Yin defines the case study research method as an empirical inquiry that investigates a phenomenon within its real-life context in a situation where the boundaries between the phenomenon and context are not clearly evident and in which multiple sources of evidence are used (Yin, 1984, p.23). The case study method is useful in

illustrating complex concepts and processes that feature highly nuanced, intangible subjective features that are interdependent. These case studies employ detailed contextual analysis of a limited number of firms and their relationships. Researchers have used the case study research method for many years across a variety of disciplines. For example, economic geographers have made extensive use of case studies to examine the relationships between the firm and its environment in a wide variety of contexts.

The rationale for studying firms in Poland is that it provides a window into the Japanese firm in a post-socialist transition economy common to Central and Eastern Europe that has not previously been explored in this context. All four of the case studies are within the auto-manufacturing sector, which allows control for inter-sectoral variability. Two of the firms are suppliers and two are assemblers, therefore allowing comparison across and within these two main types of firms. Most importantly, the two most important Japanese auto manufacturing firms currently in Poland in terms of both local investment and global significance are represented in this study.

1.4.2 Sources of Information

For this study, a list of the population of Japanese subsidiaries in Poland was obtained through the Japanese Embassy in Warsaw, Poland. This initial contact information was supplemented with corporate information gathered from the individual companies' web sites, company reports from Mergent Online, and corporate directory information from sources including Kompass. From this point, the majority of empirical data has been obtained through semi-structured, in person interviews with management at the case study firms. The questionnaire used in these interviews is available for inspection in Appendix D. A map of Japanese investments in Poland is available in Appendix E.

1.4.3 The Case Study Firms

This thesis is based on case studies of four Japanese subsidiaries in the Polish auto manufacturing industry: Toyota Motor Manufacturing Poland in Walbrzych, Isuzu Motors Poland in Tychy, Denso Manufacturing in Sosnowiec, and Toyo Seal Poland in Tychy.

Table 1.1 Toyota Motor Manufacturing Poland

Location	Walbrzych, Poland Within Walbrzych Special Economic Zone Expansion into Ostrow Wielkopolski planned for 2006
Start of Operations	Phase I – Construction completed 2000, SOP 2002 Phase II – Construction completed Fall 2004, SOP planned 2005 Phase III – Ostrow Wielkopolski
Investment	Initially 350 million zloty (approx 150 million CAD) Planned Investment 900 million zloty (approx 400 million CAD)
Employment	Initially 750 workers Hiring 50 / week as of April 2004 Planned workforce of 2,100 by Early 2005
Main Products	Manual transmissions for Toyota Motor manufacturing UK (TMMUK), Planned: Diesel engines, casings

(Interview #1)

Toyota is perhaps the most recognized symbol of Japanese manufacturing success. The firm's management system, the Toyota Production System has itself been a subject of study for years and interest shows no signs of abating. The opportunity to visit the only major manufacturing investment by Toyota in Poland presents a significant accomplishment with respect to furthering our understanding of the investment behaviour of Toyota in general, and its role within the economies of Eastern Europe in particular.

Toyota Motor Manufacturing Poland (TMMP) was established in 2000 on a green field site within the Walbrzych Special Economic Zone. The facility saw the start of full operations (SOP) in 2002. Initially the plant produced diesel engines for automobiles assembled at Toyota Motor Manufacturing United Kingdom (TMMUK) facilities. The facility in Walbrzych is quickly becoming one of the region's largest and economically most significant employers. The facility is located in a traditionally heavily industrialized region of the country that is largely rooted in industry in terms of labour force. Accordingly, the case of TMMP presents an opportunity to study the manner in which the most famous and successful of the Japanese manufacturers adapts to a traditionally industrial, yet culturally divergent environment.

Table 1.2 Isuzu Motors Poland

Location	Tychy, Poland Within Katowice Special Economic Zone
Start of Operations	Established 1997, SOP 1999
Investment	Approx. 450 million PLN and growing
Employment	900 and growing at 50 / week to 1,500 – 2,000 by 2005
Main Products	Diesel engines for Opel Astra vehicles (for Opel Manufacturing in Gliwice, Poland); Marine engines (<5% of units); Diesel engines for some Honda vehicles (<2%)

(Interview #2)

Isuzu Poland is a joint-venture project between Isuzu Corporation of Japan and General Motors Europe². The facility was established on a green field site within the Katowice Special Economic Zone in 1997, with SOP two years later in 1999. The production line primarily concerns the manufacture of diesel engines for the Opel Astra line of vehicles under assembly in General Motor's Gliwice facility, as well as a small share of marine engines for the US market, and engines for Honda vehicles. The most interesting characteristics of this case study is the joint ownership between General Motors and Isuzu Corporation, and its potential impacts on the design of the production system at this facility. Isuzu presents an interesting contrast to the case of Toyota as both are relatively large, and recent investments by giant Japanese corporations on green field sites in traditionally highly industrialized regions of Poland.

Table 1.3 Denso Manufacturing Poland

Location	Sosnowiec, Poland Within Katowice Special Economic Zone
Start of Operations	Established 1970s as Fiat, then Magnetti Marelli 100% Denso ownership as of 2000
Investment	N/A
Employment	50 – 70 – stable
Main Products	Wiper motors for MCC smart car and other windshield wiper motors, arms and components

(Interview #3)

² Isuzu Corporation is itself owned by General Motors

Denso Manufacturing is one of two facilities in Poland wholly owned by Denso Corporation of Japan. The case study facility has a long history in manufacturing with a total of more than 30 years in operation. Since the 1970s, the facility was the site from the production of small displacement automobile engines for the Fiat 126p line of vehicles sold in Poland through to the 1990s. The facility was acquired by Magnetti Marelli, a supplier to Fiat of Italy during the transition period in Poland at the end of the 1980s. In 2000, Magnetti Marelli was itself acquired by Denso Corporation of Japan and this facility became a wholly-owned subsidiary and was renamed Denso manufacturing. Currently, the facility manufactures windshield wiper motors, arms, and other components for vehicles including the MCC SmartCar line of vehicles. This facility forms an interesting contrast with the other three case studies, all of which are very recent facilities with little experience in Poland’s long industrial tradition. By contrast, Denso Manufacturing is an old Polish manufacturing facility with significant socialist-era competencies yet now under full control of a Japanese parent firm. It is a most interesting case because it allows to test the extent to which a change to Japanese ownership, and method of entry in general, can influence a the hybridization of a management system.

Table 1.4 Toyo Seal Poland

Location	Tychy, Poland Within Katowice Special Economic Zone
Start of Operations	Established 1997, Start of operations 1999
Investment	N/A
Employment	50 and growing
Main Products	Oil seals for auto manufacturing industry

(Interview #4)

Toyo Seal Poland is a new green-field investment located in Tychy (down the road from Isuzu Poland) in the Katowice Special Economic Zone. The facility is a wholly owned subsidiary of Toyo Seal Corporation of Japan. It is a new operation, having been in full operation for less than five years at present. The facility is involved in the manufacture of oil seals for the auto manufacturing industry, primarily in supply of

other Toyo Seal facilities in Europe, chiefly operations in the United Kingdom. The facilities in the UK are mainly first tier suppliers to auto assembly operations in Europe. In contrast to the other three firms, the case of Toyo Seal is a good example of a relatively small-scale Japanese manufacturing subsidiary supplier and will form an interesting comparison with the two large green field operations of Toyota and Isuzu.

1.4.4 Methods of Analysis

The analysis of the information collected through interviews with the four case study firms is divided into three sections. First, the actual practices of the case study firms are compared to what has been documented about lean production practice for firms in Japan (by Womack, 1990; Liker et al, 1999; Abo, 1994; and others). This comparison will reveal whether the production management systems of the four case studies are hybrids of Polish and Japanese practice. The results of this comparison are then used to construct an index of hybridization. This index has been established by Abo (1994) and describes the extent to which a case study firm strays from what is known about lean production in Japan. This study is expected to be the first of such measurement of the hybridization of the JMS for branch plants in Central and Eastern Europe. Second, these indexes are arranged according to how they measure human and material elements of the management system in what is known as a four-perspective analysis developed by Abo (1994). This method of analysis is used to construct a typology of the general hybrid types of management system evidenced from the case studies. Finally, the index of hybridization is compared to the performance of the case study firms vis-à-vis their parent firms. This comparison is the basis for developing trajectories of hybridization, a measurement first proposed by Boyer et al at the GERPISA group in France (Boyer et al., 1998). The emerging hybridization trajectories are examined to determine whether they are appropriate for the long run development of Polish industry.

1.5 THESIS ORGANIZATION

The thesis is organized as follows. Chapter one introduces the idea of production system hybridization, and gives an overview of existing literature on the subject, as well

as outlines the general parameters of this study. Chapter two frames the existing work on hybridization within the evolutionary theory of the firm, and specifically, in relation to firm competencies and direct foreign investment. Chapter three is a comparative assessment of the Polish and Japanese industrial systems, situating the hybridization process in the context of a transition economy. This chapter also explicitly addresses the role of the concept of “culture” in the hybridization process. Chapter four culminates in the presentation and discussion of the empirical findings. This chapter describes the management systems of the four case study firms. Chapter five takes the analysis of empirical evidence further by examining the indexes, typologies, and trajectories of hybridization. Chapter six, the final chapter, contains conclusions about the significance of the findings, their implications for Japanese subsidiaries as well as their host economies, and about hybridization research in economic geography.

CHAPTER 2: THE INTERNATIONALIZATION OF FIRMS AND HYBRIDIZATION

Theories of the firm rarely mention hybridization, and studies of hybridization are not explicitly connected to theories of the firm. Yet, theories of the firm seek to explain the behaviour of firms and hybridization is a significant expression of firm behaviour over time and place. From this perspective, the evolutionary theory of the firm with its explanatory emphasis on how firms behave and adapt over time can be readily extended to incorporate adaptations of the firm across place.

In this chapter, I explicitly connect the hybridization of management systems through direct-foreign investment within recent developments in the evolutionary theory of the firm. The concept of firm competencies is the central theme of the evolutionary approach (Hamel & Heene, 1994). Building on the work of Dunning (1980) and Caves (1971), this chapter explores how firms exploit their competencies to gain competitive advantage in foreign markets. In particular, recent work within the evolutionary school by Kogut and Zander (2003) as well as related studies in the regulationist tradition (Boyer et al., 1998) demonstrate how the process of international production causes the adaptation of a firm's competencies. This chapter is divided into three sections. The first section builds on various perspectives on the theory of the firm to develop the concept of the competence of the firm. This section examines what competencies are and how they define the role of the firm. The second section looks at the process of international production and its role in the internalization and internationalization of a firm's competencies. The third section examines the effect that international production has on the evolution of the competencies of the firm through adaptation and learning. The interaction between the firm and the region is brought to light theoretically as the driving force behind the hybridization of the a firm's competencies.

2.1 THE COMPETENCE OF FIRMS

In conventional price theory within economics as well as related location theories in economic geography, the firm was typically assumed to be a “black box” converting price signals into commodities without substantive explanation of the processes involved (Nelson & Winter, 1982). Alternative approaches however, have paid increasing attention to the reality of firm behaviour and this has been recognized and reflected in the work of some economic geographers (see for example Krumme, 1970). However, even with these early advances, geography has paid little if any attention to issues of factory management³ and processes “beyond the factory gates” – the focal point of this thesis. Perhaps this neglect is because these topics have been largely perceived as lying outside “the legitimate explananda and, perhaps, competence of economic geographers” (Maskell, 2001, p.329, see also Smith, 1974). In this context, an evolutionary theory of the firm provides an appropriate starting point to analyze the reality of firm behaviour, including with respect to factory management processes.

An evolutionary theory of the firm illustrates an institutional approach in that it emphasizes the embedded, path-dependent, and evolutionary nature of the firm (see Hayter, 2004). Of particular significance and interest in this thesis is the evolutionary component, which refers to the complex processes by which the firm grows, both quantitatively in terms of size *and* qualitatively in terms of its abilities. The process of international production plays a key role in the evolution of the firm. The evolutionary perspective stems from the resource-based (Montgomery, 1995; Penrose & Slater, 1980; Wernerfelt, 1984) and knowledge-based (Nonaka *et al.*, 2000; Teece & Transamerica, 1987) theories of the firm. From the resource perspective, the firm is a collection of productive resources for the purposes of producing and selling goods and services (Penrose & Slater, 1980, p.24). Productive resources include both tangible, physical elements of land, equipment, natural resource, raw materials, finished and semi-finished goods and so on, as well as human resources in the form of various types of labour and expertise (Penrose & Slater, 1980). However, it is the *services* that these resources

³ In particular: work administration and organization, production control, procurement, supplier and community relations

provide rather than the resources themselves that are the inputs in a production process⁴. Penrose asserts that the important distinction between resource and service is that the former defines a bundle of potential services and exist independently of their actual use, while the latter cannot be so defined because it implies some actual use or activity. In essence, services are a function of and result from the way in which particular resources are used in particular groupings or bundles by a firm. For Penrose, it is this distinction that governs the uniqueness of firms. It is also here that the contributions of the knowledge-based perspective regarding ways of knowing and methods of knowledge transfer become significant. The combination of knowledge and resource based theories of the firm blossomed into the emerging evolutionary perspective adopted in modern theory (Hamel & Heene, 1994; Kogut & Zander, 2003a; Nelson & Winter, 1982).

The evolutionary theory of the firm is a competence-oriented theory of the firm in which the concepts of *resource*, *knowledge* and *services* collectively define firm *competencies*. While the firm is still considered an assembly of diverse assets under administrative direction and resulting in valuable products or services, the basis of its competitiveness rests specifically with the heterogeneous manner in which these assets are assembled in bundles (Maskell, 2001). Therefore, the *raison d'etre* of the firm is its capability or *competence* to conduct some process of activity more efficiently than other firms. The source of this efficiency is thought to rest with the evolution of an assembly of resources that through historical success, accumulation, learning, and routinization allow the firm to create and increase market-relevant value (Nelson & Winter, 1973, 1982). Furthermore, while a firm may require a whole range of “pedestrian resources” such as cash, buildings, and so on for its operation, its true strength lies in its ability to combine resources that are in principle available to everyone on the market, into distinctive and valuable *competencies* (Maskell, 2001, p.337; Wernerfelt, 1984)⁵. The concept of firm *competence* is therefore central to an evolutionary theory of the firm. Hamel offers perhaps the most comprehensive assessment of firm competencies in relation to both the work of Penrose and more recent evolutionary approaches (Hamel & Heene, 1994; Kogut & Zander, 1996).

⁴ Penrose avoids using the term *factor of production* when speaking about resources because she claims it blurs the important distinction between *resource* and *service* (Penrose & Slater, 1980)

⁵ In this sense the term *competencies* builds upon Penrose's idea of *services*

For Hamel, firm *core competence* is a *bundle* of skills and technologies (Hamel & Heene, 1994, p. 11). A core competence is not an inanimate object, that is, not an asset or *resource* in Penrose's sense of the word, but rather a function or activity. In this sense, Hamel's core competence is broadly synonymous with Penrose's idea of *service*, and the more general concept of entry advantage (see for example Hayter & Edgington, 1997). Competence implies some ability or capability within the firm to execute actions, through a combination of skills, technologies, and resources, that are meaningful, that are valuable and in demand to the market. Hamel differentiates between *non-core* and *core competence*. While the former may be peripheral, in other words necessary but insufficient to a firm's competitive success in an industry or market, the latter may be *core*, in other words form the central basis for competitive success. In essence, some capabilities are nice to have, some are critical. A competence therefore can be considered any heterogeneous bundle of skills, technology or resources combined in a firm, while a *core* competence is such a bundle that positively distinguish a firm from its competitors because it affords the firm the ability to do something unique, or something better, more quickly, or cheaply (Maskell, 2001). Along these lines, a competence can only be considered core if it passes three tests. First, the competence, as a bundle of skills, technologies and resources, must "make a disproportionate contribution to customer-perceived value" (Hamel & Heene, 1994, p.13). That is, it must deliver some *core* benefit to the customer in terms of value. Hamel gives image recording capability in the case of a videotape product, or user friendliness in the case of Apple computers as examples of core competencies. In addition to core customer value, a core competence must pass the second test: it must be competitively unique in the sense that it should not be a ubiquitous competence for firms in that industry. By way of example, while all auto manufacturers produce power-train components, this competence cannot be regarded as *core* to these firms unless it positively distinguishes them from their competitors. For example, Honda has a core competence in production of its engines for this component is generally regarded as imparting disproportional value to its automobile products (Hamel & Heene, 1994; Mair, 1994). Finally, a core competence provides entry into (or at the very least have relevance for) new product-markets. That is, a core competence constitutes a bundle of skills, technologies, and resources, that is relevant to the firm beyond its

current product mix in terms of competitiveness. A core competence therefore transcends pure product-oriented capability vis-à-vis competitors.

On the basis of these contingencies, Hamel identifies three categories of core competencies that are extremely important to an analysis of the management system. The first of these competencies is the *market-access* competence and includes bundles of skills that link the customer to the firm through marketing and sales, brand identity, and perhaps distribution and logistics. The second type of competence is the *functionality* competence, defined as bundles of skill enabling the production of products or the provision of services with unique functionality. This type of core competence is more or less synonymous with the *product-differentiation* firm-specific “entry advantage” described by Caves in his theory of international production (see Caves, 1971). Hamel also describes a third, *integrity-related* competence, which allows a firm to execute the other two competencies more efficiently, flexibly or reliably than competitors⁶. It is this third type of competence that is of primary interest in a study of the hybridization of management systems. Speaking of the transformation catalyzed in the international automobile industry by Japanese producers in the 1970s and 80s, Hamel asserts that:

Not surprisingly, quality and reliability became key differentiators in the minds of customers, and integrity-related disciplines constituted a genuine “core” competence for Japanese producers (Hamel & Heene, 1994, p.17).

Accordingly, the bulk of the skill sets comprising the Japanese management system is synonymous with the concept of the *integrity-related core competence*. The management resources, technology and skills so often only loosely hypothesized to contribute to the competitive advantage of the manufacturing firm⁷ can finally be integrated into an established theoretical framework of the firm. In this sense, the evolutionary, or competence based perspective on the firm offers significant potential to a study of hybridization. The above point regarding the relationship between firm competence and the management skills of manufacturing firms is therefore instrumental to subsequent discussion of international production.

⁶ Hamel does not explicitly relate the execution of market-access and functionality-related competences to integrity competences

⁷ See for example the role of “management skill” and the manufacturing firm in Caves’ theory of international production (Caves, 1971)

In order to link the competence-based perspective on the firm to theories of international production it is useful to examine the relationship between firm competence and competitive advantage. Core competencies are considered internal to the firm; however, in relation to an evolutionary framework, “the assets of the firm consist of resources acquired *on the market* and competencies built *within* the firm...” [emphasis added] (Maskell, 2001, p.336). Therefore, it is important to recognize the impact of both external and internal inputs to production processes within the firm. As Hamel notes:

All core competencies are a source of competitive advantage, but not all competitive advantages are core competencies (Hamel & Heene, 1994, p.18).

After all, a source of inexpensive labour may provide significant advantage to a manufacturing firm vis-à-vis its competitors in high wage regions, but this factor does not represent a core competence for it is available to other firms entering the low-wage region. It would seem then, that if a firm functions on the basis of core competencies that create some type of unique (though not necessarily singular) value on the market, and these competencies combine with external inputs to determine the competitive position of a firm, then what is required is an assessment of the general conditions for this value creation. Perhaps ironically, such an assessment is pervasive not within general theories of the firm but rather with theories of international production. It is here that the competencies of the firm and factors external to the firm are combined to understand the basis for its competitive advantage. There is an opportunity therefore to combine the evolutionary theory of the firm with the vast body of literature on international production and foreign direct investment.

2.2 COMPETENCIES AND INTERNATIONAL PRODUCTION

Since Hymer’s groundbreaking analysis of the international firm, explanations of DFI have increasingly emphasized the related concepts of entry advantages, ownership advantages, and firm-specific competencies as catalysts of international production. This “industrial organization” approach offers the most potential for understanding direct-foreign investment (DFI) for two reasons. First, it recognizes that direct foreign investment involves the transfer of a package of knowledge, capital and what Dunning terms “entrepreneurship” and second that this bundle or package is something that resides

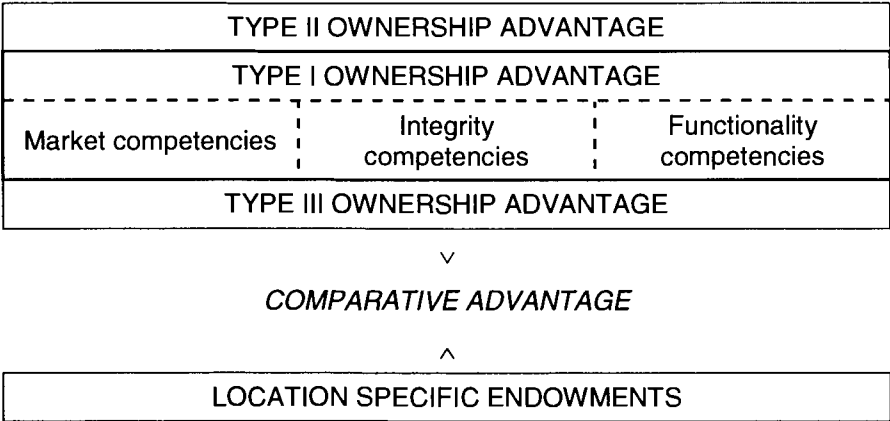
within the boundaries of a firm (Dunning, 1980, 2002, p.23). The argument that follows is quite simple. When a firm enters a foreign region to establish operations, it is at a disadvantage because it lacks and must acquire, at some cost, information that any indigenous firm would already possess about the local condition (see Bain, 1956; Caves, 1971, p.5). This barrier to entry necessitates that the foreign firm possesses, some entry advantage, not available to local firms in order to be competitive (Hymer, 1976). This advantage, internal to the firm, may take many forms but is commonly referred to as the *ownership advantage*. Ownership advantages all share several important characteristics. They may take the form of a unique asset of the firm, such as a patented innovation, or differentiated product, or even simply unique information or knowledge (Caves, 1971, p.4). However defined, according to Caves these advantages can be exploited in any market, location, or situation, without incurring additional costs to the firm. Accordingly, the concept of the ownership advantage resonates well with the concept of the core competence. This can be illustrated with an extension of Dunning's eclectic model of international production.

Perhaps the most comprehensive model of direct foreign investment based on the concept of the ownership-advantages-cum-competencies is Dunning's eclectic model of international production (Dunning, 1980, 1988, 2002)⁸. In this model, the roles of internal and external factors driving a firm's international expansion are integrated. Accordingly, the eclectic model offers potential as a definitive foundation to understand international production and hence the transfer of competencies across international boundaries. Within its eclectic framework the extent to which a firm will engage in international production is determined by two factors within the model. First, the comparative *ownership* advantage it can lever vis-à-vis indigenous (local) firms, and second, the differences in *locational* factor endowments between the firm's home and host country. Dunning identified three distinct types of ownership advantages significant with respect to the first factor (Dunning, 1980, 2002, p.58). The type I ownership advantage is that which stems from size, monopoly power or better resource access or capability of the firm. This is the most pertinent type of ownership advantage to an

⁸ Dunning's model may be considered 'eclectic' because it is an attempt at a comprehensive 'all around' collection and integration of best elements from various DFI theories

evolutionary perspective on the firm because it closely parallels the concept of core competencies. The type II ownership advantage is any non-production overhead that may be available to a branch-plant at little or no cost and includes access to administrative, accounting, and research and development functions of the firm. This relates to the ability of a branch-plant to access the assets of the parent firm and therefore incur less cost compared to an indigenous operation or a start-up that would have to make such investments anew. Finally, the type III advantage refers to the extent of multi-national production experience possessed by the firm. Therefore, the greater the ability of the firm to operate in a diversity of regions, the greater the firm's type III ownership advantage. The ability to operate in diverse regions relates to the firm's ability to take advantage of a wide range of locational factor endowments. According to Dunning, some endowments are location-specific and include natural resources, labour and access to markets, and also the broader commercial environment including government legislation and industrial policy (Dunning, 1980, p.9). It is therefore possible to integrate the concepts of ownership specific advantages and location specific endowments with the concept of firm competencies in a revised perspective on the eclectic model of international production (Figure 2.2.1).

Figure 2.2.1 Revised eclectic model of international production



Concepts drawn from: (Dunning, 1980; Hamel & Heene, 1994)

As Figure 2.2.1 demonstrates, ownership advantages and external endowments are combined to form the basis of a firm's comparative advantage in a particular institutional context. This resonates with Hamel's recognition of core and non-core

competencies, as well as with Dunning's external inputs to value creation. In combining the concepts of ownership advantages, locational endowments and core competencies, Figure 2.2.1 explains the process by which core competencies are transferred through the process of international production.

Two conditions are necessary for a firm to engage in international production. First, the firm must possess an advantage (competence) it can exploit in a foreign location, and second, it must be willing to exploit that advantage itself, rather than just license or sell it to indigenous firms. In this sense, direct-foreign investment effectively "internalizes" competencies within a firm as it transfers them across national boundaries.

Therefore, a precondition of international production is that a firm needs to internalize its core competence, rather than externalize through the market or public fiat (Dunning, 1980). This is significant because by internalizing competencies, the international firm is able to *do* that which would not be achievable through the market alone (Beamish et al., 2001, p. 3). Recent evolutionary perspectives address this idea of internalization of competencies. In their award-winning article⁹, Kogut and Zander argue that "the question facing the firm is whether this advantage [core competence] is more economically--in term of its costs and market effects--transferred to an affiliate subsidiary or to other firms." (Kogut & Zander, 2003a, p.518). Importantly, for Kogut and Zander, the decision to internalized need not be based on Williamson's classic transaction-cost economics, where opportunism, and hence the hazard of the market, is an underlying assumption (see Williamson *et al.*, 1991). However, other evolutionary theorists show that transaction-cost economics need not be entirely discounted in explanations of internalization of competencies (Verbeke, 2003):

If the researcher aims to understand why MNEs have particular boundaries and what general principles they use to organize their external and internal contracts, including the overarching organizing principles to manage their subsidiary network (Rugman and Verbeke, 2001), internalization theory remains relevant (Verbeke, 2003, p.503).

However, transaction costs may not be the best avenue where the objective is to describe the expansion of a firm through a strategic decision making process. According

⁹ Journal of International Business Studies 2003 Decade award winning article

to Verbeke, in such a case a focus on learning processes may instead be warranted. This is an important contribution to the role of internalization theory with respect to hybridization. While it is important to recognize the role of transaction costs and economic opportunism from the large scale perspective of industrial organization on the international stage, in this thesis it is simply sufficient to recognize that there are indeed (transaction) costs associated with the transmission of knowledge both within and between firms (see for example Teece, 2000).

Most importantly however, the decision by the firm to internalize its competencies is the catalyst for the transfer of competencies across international boundaries. The process of competence transfer cannot be understated when the purpose is to show the impact of cultural and institutional differences on international production. In essence, “why worry about cultural differences unless the home office felt it wanted to transfer practices and technologies across borders?” (B. Kogut & Zander, 2003b, p.513) A first requisite step in the adaptation of the firm to local circumstances involves the transfer of its competencies across international boundaries. A useful manner to characterize this process is in terms of an international transfer of technology. Technology transfer lies at the heart of the issue of growth of firms, domestically and internationally, and therefore

It is impossible to avoid the role of technology transfer when confronting the business history of multinational investments or in the accounts made by managers (B. Kogut & Zander, 2003b, p. 514).

The technology transfer perspective is echoed repeatedly within the extensive literature on foreign investment. Within this literature, there are various interpretations of the nature of “technology” and the process by which it is “transferred”. These different approaches need to be explored in perspective of the evolutionary theory of the international firm presented thus far in this chapter.

Jones (1970) defines the role of technology in a theory of international production and clarifies the concept of technology transfer. For Jones, “technology” refers to the way in which resources are converted into commodities” (Vernon, 1970, p.73). Technology in this sense is a broad term that is roughly synonymous with the ownership advantages in the *eclectic model* of international production. Recalling that core

competencies represent a particular type of ownership advantage¹⁰, Jones' "technology" and the definition of "competence" demonstrate significant overlap. The extent of this overlap can be explored by defining the various types of technology transfer. For Hall and Johnson (also in Vernon, 1970, p.306-358), a consideration of technology transfer in the process of international production is important because intra-firm transfers may be less costly than inter-firm transfers to execute, and intra-firm transfers are empirically, at least as, or even more important, than inter-firm transfers.

Technology is not a catch-all container, and in our case, to the role of specific bundles of skills and assets (including people) that make up a firm's core competencies (Vernon, 1970, p.306). In this respect, three types of technologies can be identified. General technology is that which is common to an industry. All firms with an auto manufacturing capability would share that general technology. In this sense, general technology parallels the previously established idea of *non-core* competence that might nonetheless be a requirement of participation in an industry. System-specific technology on the other hand, refers to information that provides a firm its competitive edge that is imparted through participation in certain activities. Importantly, this could consist of a set of ingenious procedures, unique solutions to common problems and so on.

System-specific technology is when a firm, in manufacturing an item, acquires information that is peculiar to that item (Vernon, 1970, p.308).

Clearly, system-specific technology refers to a type of core competence possessed by a firm: the equivalent of Hamel's *functionality-related* core competence. Thirdly, Hall and Johnson identify the firm-specific type of technology, which is derived from the firm's overall activities, and unlike the system-specific technology, cannot be attributed to any specific item the firm manufactures. An example of such technology might be special capabilities in complex assembly operations through advanced production control. In this way, firm-specific technology is congruent with the both *integrity-related* and *market-related* core competencies.

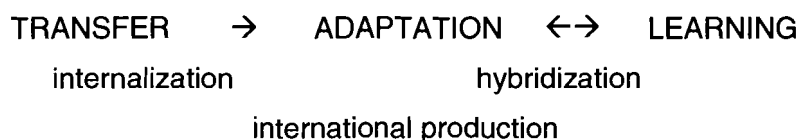
¹⁰ See Figure 2.2.1 Revised eclectic model of international production

The transfer of technology is only a first step in hybridization. The transfer of technology and knowledge through international production also involves the adaptation of competencies to local circumstances.

2.3 HYBRIDIZATION OF COMPETENCIES

Explanations of DFI by Hymer, Caves, Dunning and others have emphasized the principles underlying the evolution of the international firm. The focus has however been on why international production is necessary, and the mechanics driving the transfer of competencies. But what is also significant is how branch plants implement the competencies of the parent firm and what happens to those competencies in a foreign country. The *embeddedness*, *path dependency*, and *evolution* of competencies are important factors in defining the hybridization process as an outcome of post-entry behaviour (see Hayter, 2004). Competencies are *embedded* in the sense that the firm is tied in specific ways to the institutional, cultural and other aspects of its home environment. At least part of the firm's competencies are defined by the characteristics of the government, the market, availability of skilled labour, subsidies, access to capital and natural resources, industrial policy, the education system and other endowments specific to the firm's home environment. As pertains international production, the firm is *path dependent* in that it relies on the competencies developed in the home environment to provide an advantage in a foreign market. In this way, the firm is a creature of what it did in that past and in a particular commercial environment. Path dependency is related to the concept of internalized competencies, and suggests that international production involves the transfer of existing competencies within the firm and across regions. Finally, evolution suggests that while the firm may initially be dependent on the competencies it has developed at home and transfers these competencies abroad, it eventually adapts its competencies as a result of interaction with the institutions, culture, and the harder locational endowments of its host environment, be they natural resources, labour standards, or industrial policy (Hayter & Edgington, 1997). In this sense, the firm learns from its host context. Hybridization is therefore a dynamic process involving the transfer, adaptation, and learning of competencies through international production.

Figure 2.3.1 Dimensions of hybridization



While at the early stage hybridization involves the basic transfer of existing competencies, these are subsequently adapted to the institutions, culture, and other more tangible characteristics of the host environment. This adaptation can furthermore result in the learning of new competencies as the firm discovers combinations of assets, skills and technologies not present in its home operations. Therefore, the adaptation and learning of competencies should be viewed as connected consequences of the international production process and as elements of hybridization.

2.3.1 Adaptation

International production can spur the adaptation of competencies due to the costs of transfer and due to spatial barriers of entry. Initially, the simple cost or friction of transferring competencies to a foreign country can be prohibitive and cause a firm to adapt the way it operates abroad. Here, the rationale for competence transfer (and therefore DFI) rests in transaction-cost efficiency (Kindleberger, 1970). From this perspective, it is assumed that it is easier (and cheaper) to bring an existing bundle of competencies across international boundaries than to develop a new bundle of competencies in a new location. Local firms, in contrast, would have to start anew. However, if the development of new competencies is costly, the transfer of existing competencies to foreign locations is certainly *not* costless. Teece shows that there are clear costs related to the transfer of personnel, machinery, and other assets that allow the deployment of the bundles of skills that make up competencies (Teece, 2000). There are obvious travel and transportation costs, and expatriate salaries to be paid in this type of transfer. For example, experienced maintenance personnel, who are short in supply and command very high salaries may be required to support required precision machinery. These costs are not necessarily trivial. In this case, the firm may choose to, for example, use local machinery that local workers will be familiar with. However, since the costs of

transfer have never been empirically compared to the costs of indigenous development it is not at all clear that firms always chose to transfer everything. Indigenous elements may simply be substituted where costs of transfer are prohibitive, and it is reasonable to assume that one type of adaptation (or substitution even) results from the costs of transferring competencies across international boundaries.

Second, and more importantly, adaptation is the result of spatial barriers to entry. Spatial barriers to entry can ultimately be defined as the difficulties faced by foreign firms in competing with domestic competitors on their home turf (Hayter, 1981; Hayter & Edgington, 1997). The eclectic model of international production is an expansion of the entry advantage versus entry barrier argument and for this purpose serves us well. If competencies (say the ability to produce precision ball bearings) are dependent on endowments of a home location (say labour skilled in machining processes) that are not present in the foreign location where the firm plans to invest, the firm is clearly facing a spatial barrier to entry. In this case transaction cost economics are not a sufficient explanation of adaptation processes because they presume that the knowledge underlying a firm's competencies can be packaged and transferred at a some cost, while it cannot always be. The characteristics of the host region, its broader institutions, culture and market conditions all play an important role. Consider the following example:

Direct investment is the transfer of the organizational principles, or knowledge, of the firm from one country to another. Italy, despite its economic wealth, has a strikingly lower share of world direct investment than comparable countries.

From the many studies on the more dynamic Italian regions, one can hazard the guess that outward direct investment from Italy is impeded by the difficulty of transferring knowledge grounded in the close ties within industrial and regional networks. The characteristics of social knowledge, i.e., how it is known to groups of people, influences the ability to transfer technology and, hence, direct investment flows (Kogut & Zander, 2003a, p.517).

As Kogut and Zander illustrate, Italian manufacturing firms find it quite difficult to operate abroad without the close-knit social ties on which they are dependent at home. Seemingly, competencies developed in one location are embedded in that location and invariably dependent on it. The types of competencies that cannot be readily transferred in unadapted form are termed *locally-specific*, while competencies that are easily

transferable across regions are termed *globally-specific* (Beamish et al., 2001). Locally-specific competencies provide the firm with competitive advantage only in a certain range of locations, because these competencies are dependent on certain locational endowments, be these the availability of skilled labour, access to subsidized capital, or particular cultural patterns or consumer behaviour. In contrast, globally-specific competencies are those that are not as susceptible to spatial barriers to entry because the firm has considerable experience in implementing those competencies abroad. Globally-specific competencies parallel the concept of the Type III ownership-advantage in that both these concepts are related to the extent of a firm's international experience. Therefore, assuming some mix of globally and locally-specific competencies, the international firm is in a situation where some competencies can be transferred unadapted to branch-plants, while others cannot. Furthermore, some of these competencies within its fold may be absolutely critical to the firm, while others may not¹¹. In the former case, the firm may seek to *adapt* by modifying the incompatible competency so that it becomes transferable. For example, an Italian firm dependent on close-knit social relations with suppliers may attempt to codify, or otherwise make formal those relations to enable their transfer in the absence of the social bonds in a foreign location (apparently such attempts have not occurred, or been largely unsuccessful). In the case of the latter where a competence is not critical to the subsidiary, it may simply be omitted from the transfer process.

Therefore, the transfer of a firm's competencies abroad is subject to the costs of this transfer, as well as the dependence of competencies on the characteristics and locational endowments of the firm's home region¹². This perspective on the mechanism of competence adaptation is strongly supported by the recent research, which shows that the value of competencies is strongly dependent on the institutional context in which they are deployed (Boyer et al., 1998)¹³. It needs to be noted that this context, usually in the form of a host region, country, or economy, is far from a passive agent in the process of

¹¹ Recall the earlier discussion of core vs non-core competencies

¹² This conclusion is formally represented as the basis for competitive advantage within the eclectic paradigm model of international production

¹³ See in particular the work of GERPISA (Groupe d'Etude et de Recherche Permanent sur l'Industrie et les Salaires de l'Automobile) <http://www.univ-evry.fr/PagesHtml/laboratoires/gerpisa/>

adaptation. For example, Schoenberger shows how the firm both shapes, and is shaped by the regional context in which it operates (in Barnes & Gertler, 1999). In this sense, hybridization should be viewed as much a bargaining as a learning process.

In summary, international production starts with the transfer of competencies in an attempt by the firm to exploit its competitive strengths abroad. However, the firm may bear significant costs that impact its decisions regarding this transfer process, and furthermore, some of its competencies are dependent on the conditions within the firm's home country and cannot easily be transferred or exploited abroad. Therefore, the firm faces spatial barriers to the entry of its competencies. The firm addresses this obstacle by adapting its competencies to the characteristics of the host environment. In some cases, this results in a mix of adapted and un-adapted competencies within the branch-plants of the firm. The resulting mix of competencies is a hybrid system, in that it resembles elements of both the home and the host environments. This process of hybridization is ongoing as a firm struggles to implement the competitive advantage offered by its competencies in a foreign location. Success depends upon an acceptable level of performance at the subsidiary vis-à-vis both the parent firm, and ultimately, its competitors at home and abroad. The branch plant's performance is dependent on how well the firm "learns" through successive adaptations without compromising the competitive advantage afforded by its competencies.

2.3.2 Learning

International production through direct foreign investment is a learning process for the international firm. Here, the focus is on the potential of DFI to stimulate the development of new competencies and qualitative growth within the firm. While existing competencies can be transferred and some subsequently adapted to a foreign location, entirely new competencies can also emerge. Learning can be conceptually framed as the outcome of two separate forms of adaptation. In the first stage, the adaptation of one technology, skill, or asset may cause conflict with another technology skill or asset, and this conflict can compromise the competitive advantage of the firm's competencies (Abo, 1994). For example, the ability to use simple-automation technologies within a factory can be compromised by the shortage of labour skilled in the maintenance of industrial

robots in a foreign location. In such a case, adapting the level of skill in terms of maintenance expertise adversely affects the firm's competence in industrial automation. Therefore, this first stage of adaptation, undertaken by the firm as a result of the characteristics of the local labour market, compromises its competencies. Clearly, this first adaptation could have negative consequences for the firm's competitive position. Therefore, subsequent adaptation is needed within a bundle of assets, skills and technologies to preserve the integrity of the firm's competencies. This secondary adaptation requires a process of learning. The theoretical justification for this second stage of adaptation is rooted in the recognition that there can be no strict additivity of the skills, assets, resources and technologies that comprise a firm's competencies (Boyer et al., 1998). This means that the individual components of a competence cannot be disaggregated, adapted or optimized in isolation. In the example above, the firm could remedy the situation by amending the level of automation, thereby bringing it in line with the maintenance skill available at hand. The secondary stage of adaptation therefore involves a search for an acceptable combination of un-adapted and adapted elements that preserves the integrity of competencies. This type of search for complementarities has been demonstrated in a number of international firms, and even in specific relation to manufacturing management systems (Bartlett et al, 1988). Recognition of these two types of adaptation, one to local context, and one to conditions within the firm, is therefore important. It is especially significant in light of the existing view that adaptation is inherently detrimental to the competitive advantage of the firm (see for example Abo, 1994; Itagaki, 1997). This view is based on the strict additivity of competencies and has been shown to be inconsistent with most recent developments in the evolutionary perspective on hybridization. It has been shown that where adaptation is conducted with complementarities between elements in mind, competitive advantage need not *necessarily* suffer (Boyer et al., 2002). Adaptation to the institutions, culture and locational endowments of a region is therefore positive for the firm as long as it learns to resolve conflicts between adapted and un-adapted elements. If adaptation is understood as an ongoing process it is possible that it will lead to the learning of new competencies at the branch plant that are not present in the parent firm.

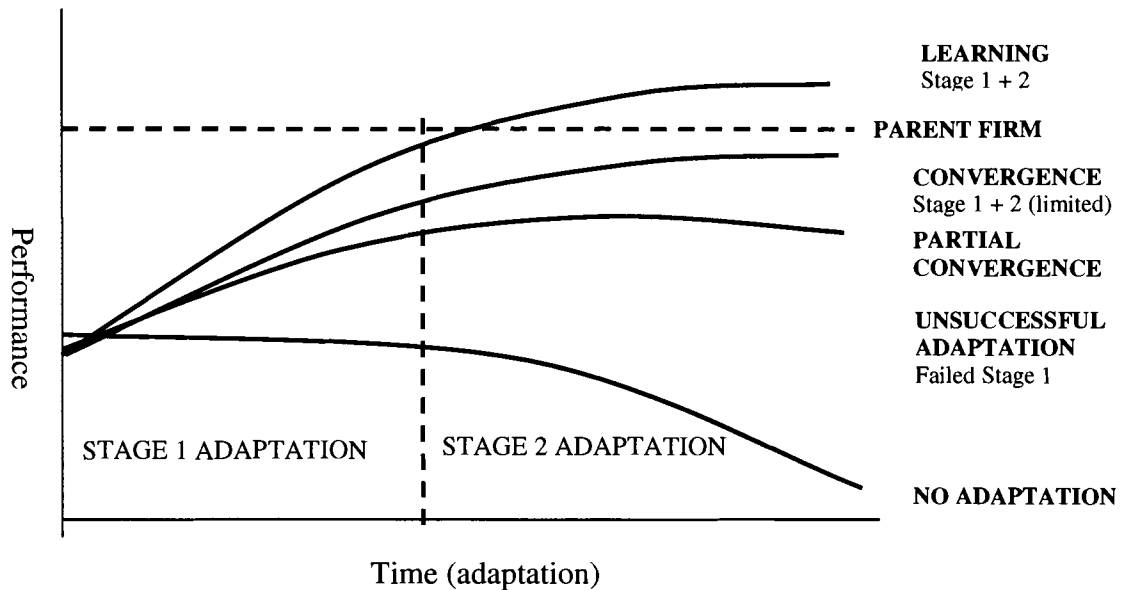
Accordingly, an evolutionary perspective on the theory of the international firm comprehends international production as a ‘learning’ process. The distinction between adaptation and learning is subtle and they are part and parcel of the same process of hybridization. However, learning occurs when adaptations implemented in a branch plant generate performance (in terms of competitiveness) that is at least on par with the parent facility. That is, learning occurs when the branch-plant is able to replicate the essence of what the parent does while using slightly different competencies. In order for this to occur, the primary and secondary stages of adaptations must match or improve a subsidiary’s comparative advantage vis-à-vis the parent. Therefore, in hybridization, *learning* can be said to occur when, through tinkering with adaptation, a firm discovers bundles of skills, assets, and technologies that are superior in the context of a particular institutional context. Learning is therefore the creation of new *location-specific* competencies within the branch-plant (Beamish et al., 2001). By contrast, innovation can be said to occur when *globally-specific* competencies are created within the branch-plant and are integrated back into the parent firm. These are of course optimal outcomes and not all hybrid factories will show learning or innovation in competencies. The various possible outcomes of hybridization (relationships between the adaptation process and comparative advantage) can be described as *trajectories of hybridization*.

2.3.3 Trajectories of Hybridization

The idea of trajectories of hybridization is useful in illustrating the possible outcomes of the hybridization of competencies (Boyer et al., 1998). The lowest trajectory of hybridization develops when no adaptation of competencies occurs at any level. This occurs if a firm enters a foreign location with no recognition of the barriers presented to its competencies. In this case, the characteristics of the foreign location and the competencies of the firm are incompatible and the competitive position of the subsidiary likely suffers. The second trajectory represents some initial success through initial adaptation to locational endowments. This trajectory could be introduced through adaptation as a cost saving measure (for example reducing number of technical specialist expatriates within the subsidiary) or as stage-one locational adaptation – either way not all incompatibilities are resolved and some competencies are still in conflict with

locational endowments. In this case, key competencies remain detached from location-specific endowments. In the third type of trajectory, the first stage of adaptation is completely successful. This means that the firm manages to identify elements in the host environment that are incompatible with its competencies and make all necessary adaptations. However in this trajectory the second stage of adaptation is not undertaken and the firm struggles with the internal contradictions to its system. Some of the adapted elements clash with un-adapted elements, causing difficulties for management, and performance likely suffers. In the fourth trajectory, complete convergence with the parent's level of competitiveness is possible as the branch-plant successfully identifies and remedies incompatibilities between its competencies and locational endowment, and resolves any conflicts that arise among its competencies due to the adaptations. In this trajectory, complete first and second stage adaptation leads to a hybrid that is near the functional equivalent of the parent firm. In the final possible trajectory of hybridization, innovation becomes possible.

Figure 2.3.2 Trajectories of hybridization



Based on: (Boyer et al., 1998)

In this fifth trajectory, not only does the firm adapt competencies and resolves any internal problems, but in doing so discovers a bundles of practices that yield a competitive advantage over parent operations. In this case, the subsidiary surpasses the performance of the parent firm, and learning occurs. If the results of this learning are furthermore applicable in the firm's home country, innovation as an outcome of international production has been achieved. In this way, the concept of hybridization trajectories shows the continuum of possible firm responses to the institutional, cultural and economic differences between the donor and the host environment.

2.4 CONCLUSIONS

This chapter has provided a theoretical overview of the firm, international production, and how this process leads to the growth of the firm and the adaptation of competencies. The firm has been presented as an entity that exists and competes through its competencies and provides specific products and services that are otherwise not available. A firm engages in international production to take advantage of the competencies it has developed in its home country. However, as they are transferred abroad the competencies are invariably adapted to the institutions, culture, and locational endowments of the foreign location. This adaptation can be understood as a strategy to circumvent spatial barriers to entry and results in hybrid firms with a mix of competencies from both the home and foreign environments. The nature of these hybrids depends on the differences between the donor and host environment and the extent to which a firm's competencies are locally or globally specific. Hybridization demonstrates that international production is one of the main processes by which a firm evolves both quantitatively and qualitatively.

The nature of the actual competencies of the Japanese firm, as well as the characteristics of the Polish and Japanese economies is the focus of the subsequent chapter. In exploring these two dimensions, the actual circumstances surrounding Japanese foreign direct investment in the context of Poland can be explored.

CHAPTER 3: COMPARATIVE INDUSTRIAL SYSTEMS

The evolutionary theory of the firm highlights the roles of the donor and host economies in the process of international production. As shown in the previous chapter, competencies of the firm are themselves in part derived from the characteristics of the labour market, financial systems, and industrial policy as well as the broader institutions and cultural patterns of the donor economy. From an evolutionary perspective, international production separates the firm from the institutions, culture and factor inputs it is accustomed to in its home environment as it enters a foreign country. Depending on the characteristics of the host economy, the firm may face significant barriers to entry that erode the competitive advantage of its competencies.

To address this point the first section of this chapter focuses on Japan as a donor economy by first examining the institutional underpinnings of the Japanese industrial system. Within this industrial system, Japanese management practices are defined in a model of the Japanese management system (JMS). This system is conceptualized on the basis of the recent work of Abo (1994) and Liker *et al* (1999). The second section of this chapter deals with the characteristics of the Polish host economy. Three distinct processes are proposed to have contributed to the development of the current industrial climate in Poland. First, the legacy of the state socialist system is explored with specific reference to the paradox of “allocationism”, the nature of state-industry relations and the underdeveloped social division of labour. Second, the consequences of the transition to a market economy are examined with an emphasis on the shift to “hyper-capitalism”, an accompanying rejection of socialist industrial competencies, and the role of direct-foreign investment in the transition process. Finally, the role of Poland’s increasing integration with the European Union is explored, with a focus on European styles of corporate management.

3.1 THE JAPANESE DONOR ECONOMY

In this section the relationship between the locational endowments of Japanese industry and the core competencies of Japanese manufacturing firms is explored. The set of competencies common to the most successful Japanese manufacturing firms forms the core of the Japanese management system (JMS). The relationship between the Japanese management system and the characteristics of the Japanese economy is shown in Figure 3.1.1. This model suggests that the JMS is embedded within the broader institutional and cultural patterns that defined the Japanese industrial system. Direct foreign investment by the Japanese firm into a foreign economy can therefore be interpreted as a transfer of layers one to three of this model onto a new, host layer four. This transfer spurs adaptation of the JMS to the new host economy, resulting in the hybridization of layers one through three.

3.1.1 Culture, Institutions, and the JMS

In this thesis, the significance of “culture” in the hybridization process is highlighted repeatedly. Indeed, in studies of internationalization, whether focusing on investment, exports, capital or technology transfer, cultural difference or distance, is perhaps even more important than simple physical distance. Within economic geography, for example, Reiffenstein (2002) examined exports from British Columbia to Japan in terms of ‘crossing cultures’ that are rooted in different forms of communication, values and tastes. Earlier, numerous studies in economic geography and business interpreted the entry barriers facing exports and direct foreign investment in terms of cultural or psychological distance as reflected in different languages, customs and traditions (see for example Hayter, 1981). Culture is not a straightforward concept to define and invokes a sense of shared values, world-views and routines among groups of people with respect to a particular activity or place.

Mitchell (2000) highlights three approaches to understanding culture that are significant to the transfer of lean production from Japan to Poland. First, culture can be considered the actual, perhaps unexamined, differentiations of a people. From the perspective of production system hybridization, the concept of culture is therefore a way

to define the actual practices, common to Japanese industry, that define what Japan is vis-à-vis any other system, and in this case, the Polish system. Conversely, “culture” can be used to capture the characteristics of Poland’s economy, of the socialist worker ethic, and the manner in which Polish society has struggled with a transition to capitalism. More importantly perhaps, culture can comprise the processes by which the aforementioned patterns emerge and are developed over time. Relating this point, the concept of culture highlights that through international production, a firm moves from participating in one set of routines, practices and institutions that it is familiar with at home, to another set that is alien to it. Finally, and perhaps most concretely, culture as a concept can be used to embody the manner in which the characteristics and processes of a particular system are represented in tangible form. Here, the concept of culture closely reflects the focus of this thesis on the interface between the characteristics of Japanese society, the processes driving their development, and the emergence of a unique if not singular system of productive organization: lean production. Neither Japan nor Poland are homogeneous in culture but there are nevertheless significant differences between the countries that pose challenges and constraints to internationalization processes.

Arising out of geographic and cultural distance, hybridization is a complex socio-spatial process that is negotiated between the cultures of the donor and host economies (McCann, 2002). This distance between Japanese and Polish systems is examined primarily through a focus on the characteristics of the industrial systems of the two countries.

Indeed, the characteristics of the Japanese management system depend on the distinctive nature of Japanese institutions, cultural patterns and factor inputs (Liker et al., 1999). Early literature on the evolution of the Japanese management system raises the interesting proposition that Japanese forms of productive organization are actually rooted in western practice that was transferred from the US to Japan (Abegglen, 1958). Similarly, Odaka demonstrates how the Japanese system is a derivative of US industrial practice (Odaka, 2001). For Peterson, the roots of the Japanese management system fundamentally lie in the work of Taylor and Henry Ford (Peterson, 2002). However, the American production philosophy upon which the Japanese management system may have been built are thought to have been modified by the broader Japanese commercial

environment over time. That is, the Japanese management system is itself a “hybrid” of American manufacturing competencies and the locational endowments of Japan. The argument is that the attempt to imitate and replicate the core competencies of American manufacturers in a post-war Japanese industrial environment has yielded, through the hybridization process described in chapter two, a quite distinct form of productive organization – the JMS. Of interest here are the locational endowments¹⁴ present in Japan and how these have contributed to the divergent development of the Japanese and American systems. The evolution of the JMS should therefore be understood in the context of the conditions that characterized the Japanese economic and industrial system in the post-war period, including (Muffatto, 1999):

- Lack of financial capital in the post-war period limiting the scale of production facilities
- Corporate unionism in Japan that differed markedly from trade unionism in the United States,
- Japanese policies that favoured the development and deepening of the social division of labour; leading to increased vertical subcontracting

And, in more recent times:

- the labour market and, especially, the problem of finding young workers willing to work on production lines;
- work conditions considered particularly unattractive from three points of view known as the 3K (3D), that is, Kitanai (Dirty), Kiken (Dangerous) and Kitsui (Demanding);
- the reduction of production volume after the end of the so-called "bubble economy" and, consequently, the existence of excess production capacity;
- increase in the cost of capital, hence, of investments, which reduced the tendency to replace human workers with automation

Similarly, Fairris and Tohyama, argue that the development and success of the JMS depends on institutional factors present in Japan, and which are absent from the US, particularly relating to the elements of work organization and administration (Fairris & Tohyama, 2002). It is credible to assume that in some way the development of the JMS,

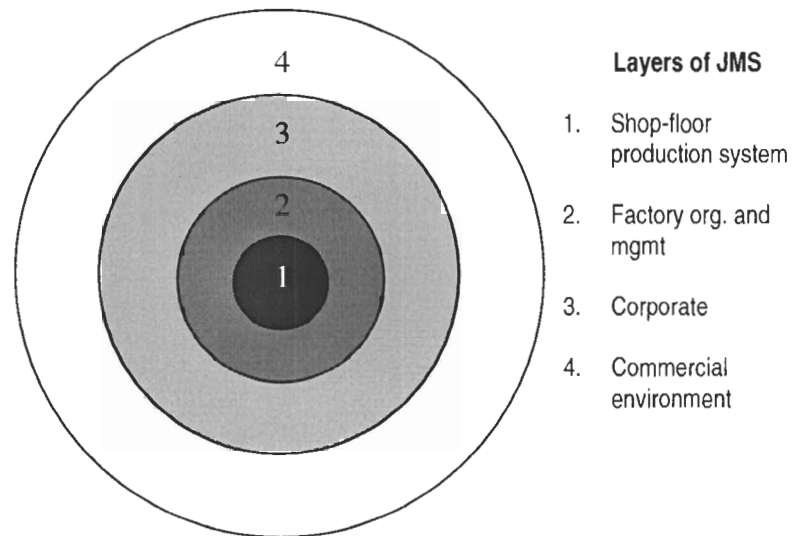
¹⁴ Location-specific endowments include regional institutions in this analysis

while having origins rooted in American manufacturing practice, was strongly influenced by the characteristics of the broader commercial environment in Japan. This literature is further evidence of the role of the donor environment to the transfer of competencies of firms. The characteristics of the Japanese management system should therefore be understood within the context of the Japanese economy.

3.1.2 Characteristics of the Japanese Management System

Liker contends that the most successful Japanese corporations share certain practices and procedures including a clean and organized shop-floor, product *and* process oriented engineering, tools that enable workers to participate in improvement activities (such as preventative maintenance and visual progress tracking systems), excellent inventory control systems, low change-over times, simple automation, and perhaps most importantly, a focus on the shop-floor from all levels of the organization (Liker et al., 1999). These characteristics are thought to compose various layers of an interrelated corporate system that defines the strengths of the Japanese manufacturing enterprise (Figure 3.1.1).

Figure 3.1.1 Layers of the Japanese management system



Based on: (Liker et al., 1999, p. 7)

The layered arrangement implies interdependency among the various elements, which is an important consideration for subsequent sections of this chapter. The first layer, or the shop-floor layer, consists of elements encompassing hard technologies¹⁵ as well as organizational technologies¹⁶. The second, or factory management layer, consists of factory-level systems and structures that support shop-floor operations¹⁷. The third, or corporate layer includes broad business and management systems, staff and labour structures outside the factory¹⁸. And finally, the fourth layer consists of what may be termed the broader commercial or institutional environment and includes consumer preferences, the legal and regulatory environment and educational system and the more diffuse elements of national culture and values orientation (Liker et al., 1999, p.9).

Other research supports the view of the Japanese firm as a system of inter-related attributes and confirms the role of external institutions (norms, regulations, and organizations of membership) within this system (Aoki & Dore, 1994). Complementing the focus on four layers of the JMS, Aoki & Dore highlight the employment systems, internal coordination, subcontracting relationships and corporate governance systems that define the successful Japanese enterprise. The work of Abo is useful in categorizing the many characteristics of successful Japanese management identified by Aoki & Dore (1994), Liker *et al.* (1999) and others. According to Abo, the practices that define the Japanese management system can be broken down into the following six groups (Abo, 1994):

- Work Organization and Administration: job classification, job rotation, education and training, promotion
- Production Control: equipment, quality control, maintenance, operations management
- Procurement: local content, procurement source and method
- Group Consciousness: small group activities, information sharing, sense of unity
- Labour Relations: hiring policy, job security, labour unions, grievance procedures

¹⁵ Equipment, tooling (Liker, et al.)

¹⁶ Rules, procedures and practices including quality standards, worksheets, preventative maintenance, quick die changes, and the whole of *kanban*. Practices directly affecting operations on the shop floor such as job classification schemes and continuous improvement activities also fall into this layer (Liker, et al.)

¹⁷ Including human resource *practices*, industrial and supplier relations, organizational culture, communication and learning processes – as a side note, some of these structures exist at the factory-level only in the Japanese firm, resting in the third or corporate level for most American firms (Liker, et al.)

¹⁸ Encompassing corporate level R&D, corporate strategy, human resource *policies* and importantly, the relation of the firm to the market, and its supply chain. (Liker, et al.)

- Parent-Subsidiary relations: ratio of expatriates, delegation of authority, managerial position of locals

Table 3.1 describes in detail the practices within each of these six groups of the Japanese management system. This approach is innovative in bringing together the work of Abo with that of Liker *et al.* by combining the three layers of the JMS with the six groups of practices identified above.

Table 3.1 The Japanese Management System

Layer	Group	Element	Characteristic
Shop-floor (1)	Work Organization & Administration	Job classification	Typically two or fewer job categories for production line workers on the shop floor
		Job rotation	JR is carefully planned and frequently conducted within and beyond teams. Its clear aim is training of multiskilled workers (e.g. training table kept by team leaders and supervisors)
		Education/Training	OJT is the main system for training multiskilled workers, together with long-term systematic training, and there is a training system for team leaders and maintenance personnel through OJT and systematic training; sending trainees to Japan and bringing trainers from Japan with special training programs and facilities
Promotion		Worker promotion based on length of service (Nenkoh) and PE, which is conducted by direct supervisors. Internal promotions to supervisor with recommendations by direct supervisor	
Corporate (3)			
Shop floor (1)	Production Control	Equipment	All production line equipment and machinery come from Japan
		Quality Control	QC conducted by workers during the process and there are accommodations for this (e.g. workers have line-stop authority; QC or zero defect (ZD) circles are very active)
		Maintenance	Shop-floor are internally trained and promoted to maintenance personnel (including inexperienced workers hired separately from ordinary workers); preventative maintenance is emphasized, shop floor workers have some maintenance roles
		Operations Management	Flexible setup and special arrangements to cope with line failures or defects (e.g. coordination and cooperation among first-line supervisors and team leaders, preventative maintenance, machine fail-safe devices, production control signal board; standard

Layer	Group	Element	Characteristic
			procedures and work manuals brought from Japan and modified and improved to accommodate local conditions (line balance adjustments); high product mix, frequent product change; reduction of die change time is significant and continuous
Factory (2)	Procurement	Local content	Local (indigenous) content <20%
		Procurement	Materials and parts procured mainly from Japan
		Procurement method	Local suppliers are held to strict observance of delivery times, arrangements made to reduce parts inventory as much as possible, technological assistance is attempted with suppliers, long-term contracts are applied to suppliers, Japanese subcontracting system exists with suppliers
Factory (2)	Group consciousness	Small group activities	All workers participate voluntarily and play significant roles
		Information sharing	Company-wide information sharing and communication actively practiced; meetings for all employees, president meets all employees in small groups, vigorous small group activities, open-style offices
		Sense of Unity	Various devices such as company uniforms for all employees, open parking, social events, morning ceremonies, etc
Corporate (3)	Labour Relations	Hiring Policy	Applicants are carefully, meticulously screened; plant site selected where there is a homogenous workforce
		Job Security	Explicit (written) no-layoff policy that seeks to avoid layoffs as much as possible; provisions for long-term employment
		Labour Unions	There is no union and labour relations are peaceful, or there is a union that cooperates with management (corporate unionism)
		Grievance procedures	There is likely no union and grievances are typically resolved mainly on the shop floor and through managerial channels
Corporate (3)	Parent – Subsidiary Relations	Ratio of expatriates	>4% from Japan
		Delegation of authority	Parent in Japan makes plans and decision
		Managerial positions of locals	Most important senior managerial positions, including president, are held by Japanese

3.2 THE POLISH HOST ECONOMY

The development of Poland as a host economy is briefly explored in terms of Poland's socialist legacy, transition to capitalism, and unfolding integration of with the European Union.

3.2.1 Socialist Legacy

For nearly half a century, industry in Poland has operated under a centrally planned, state-socialist management model that in significant ways is at odds with dominant Western, as well as Japanese practice. Existing research covering Japanese DFI says little about its interaction with the former centrally planned economies of Central and Eastern Europe. The legacy of the socialist past is significant today as Polish industry struggles to survive within the European Union and to attract investment from abroad. In order to explore the legacy of the industrial system in Poland, it is important to describe the characteristics of the Polish state socialist system its evolution from one type of expertise, cleverness and hard work, from one social interaction pattern to another, and from one type of self-image to another (Maruyama, 1993, p.164). An exploration of the character of state socialism in Poland provides insight into how Polish industry experienced the transition to capitalism and the implications of this transition as the country find it's place within the European Union.

As it relates to industrial legacy, state socialism can be credited with rapid industrialization of the Polish economy and the expansion of its economic base through the mass production of relatively simple manufactured products (van Zon, 1996). The key characteristics of the state socialist industrial system include both ideological precepts and practical elements. Ideologically, the state socialist industrial system promoted the superiority of the working class; therefore, the labourer was put on a pedestal while other occupations including the technical specialist and the intelligentsia were subordinated (Edwards & Lawrence, 2000)¹⁹. With respect to the worker, the individual ideal reflected political dedication to the socialist cause (in relation to official party policies), overachievement at work, and general concern for others (at work and

¹⁹ Maruyama (1993) shows that the Polish intelligentsia constituted a significant, if largely passive element of the Polish industrial system.

beyond). The role of the worker was to reproduce the socialist ideal both in terms of official work function and in society as a whole. These are important points pertaining to the organization of work on the factory floor and within the manufacturing enterprise in general – they bear direct relation to work organization and administration. Practically speaking however, the nationalization of private assets and resources responsible for the vast majority of productive potential in the socialist economy had the most significant implications for the system of intra-firm relations that developed²⁰ (Kuc *et al.*, 1980). Aside from issues of ownership, the role of the state was highlighted through the process of central planning, whereby broad economic targets as well as the outputs of individual enterprises, allocation of productive resources to industrial sectors, and physical, financial and human inputs to production were determined by the state (Edwards & Lawrence, 2000, p.3). This meant that the state socialist industrial system was *resource* rather than *demand* constrained, resulting in a reduction of competition between key firms. In other words, the focus was not on competition within a particular industry, but rather on the efficient allocation of resources across industries primarily through economies of scale. Of particular significance were the flows of power in the administrative command system and the role that this state bureaucracy played in delineating relations between firms as economic entities (Pickles & Smith, 1998). The resource-constrained economy under the direction of the state bureaucracy had the tendency to reduce the number of firms in an industry – often to the point of monopoly. This model of competition, or lack thereof, in combination with an emphasis on vertical relationships between state-owned enterprises and the state, severely constrained the development of the specialization of enterprises. As a result of weak specialization, the development of the social division of labour both within and across industries in Poland was stifled for decades.

It is important to understand where Poland's state socialist system fits within the world of productive models in order to compare it to the Japanese system described in the first half of this chapter. For Maruyama (1993), four categories of management systems prevail worldwide: *manufacturism*, *extractionism*, *allocationism*, and *sharism*. The basic

²⁰ Socialized industry accounted for over 98.5% of all production in Poland in 1976 (Central Statistics Office of Poland, 1977, p. 31)

assumption behind this categorization is that different historical and cultural conditions, prevailing in some countries but not others, instituted a path for the development of several types of economic systems. According to Maruyama, *manufacturism* developed in England on the basis of large-scale manufacturing, *extractionism* prevailed in Latin America, *sharism* in Indonesia, and most importantly for our purposes, *allocationism* in communist and socialist countries. Allocationism is then an underscoring characteristic of the centrally planned economic system. In *allocationist* systems, industry is accustomed to the planning of production and allocation of resources at the level of the state and profit is appropriated by the state rather than reinvested by entrepreneurial initiative. This reflects a central allocation of resources and the primacy of bureaucratic coordination. The allocationist tendencies of the Polish socialist economic system created a paradoxical situation whereby an immensely industrialized economy was in effect driven not by production via the social division of labour, but rather by allocation of resources within the economy and among trading members within the block. With little demand-related incentives, efficient productive organization was difficult to accomplish (Clark & Soulsby, 1999). Furthermore, and perhaps most significantly, what exacerbated this situation is that these tendencies rendered imported Western product and process innovations largely ineffective (van Zon, 1996, p.7). Additionally, the limited role of specialization (and the underdeveloped social division of labour) had detrimental effects on product and process innovations:

Specialization is often formal and is rather the instrument of making up for shortages, and only less an instrument of progress in technical efficiency. We are mostly linked to each other through the delivery of goods that the other country does not produce (Brada, 1988, p. 14).

The lack of innovative potential was exacerbated because the socialist system did not separate out political, social, and economic goals, which ironically caused the divergence of these elements (Edwards & Lawrence, 2000). From the perspective of the factory, long-term contractual relationship (on the basis of social and political goals) with other state-owned enterprises in the industrial combine²¹ created in Poland a situation of

²¹ The manner in which factories in Poland were grouped together under central planning into section and industries is roughly analogous to the idea of a industrial combine in a more market oriented economy (Soulsby & Clark)

resource tie-in and limited the opportunities for change or innovation over a given period of time (Kuc et al., 1980). This allocationism, centrally-planned system, led to the development of bureaucratic forms of industrial relation²² cemented through long-term contracting between state enterprises and made industrial innovation and indeed change difficult.

For van Zon (1996) the enduring legacy of the socialist period for the Polish economy is one of the differentiation of society, contrasted against, the mono-organizational nature of state socialism. The hierarchical bureaucratic form of the political system stymied the development of any responsive network of firms or an extensive social division of labour because of the focus was on the allocation of productive assets rather than product or process innovation.

3.2.2 Industrial Transition

Poland's socialist legacy defined not only the obstacles to the evolution of its industry within a global economy but also a range of competencies that may still be useful within a modern Polish economy. Unfortunately, there is a common assumption that any competencies or endowments acquired under socialism are obstacles rather than assets in the country's transformation (see Grabel and Stark, 1991). Perhaps the socialist past should not be completely abandoned in order for modern competencies to be realized in Polish industry.

The Polish economy has undergone various transitions in modern history, perhaps the two most significant being the shift from a pre-war capitalist system, to a centrally planned social-market economy, and more recently, to a free-market system integrated in the global economy. The nature of this most recent ongoing transition, which has been intensified considerably with Poland's entry into the European Union, determines the commercial environment faced by Japanese firms investing in the country. The concept of economic transition in Central and Eastern Europe can be defined as consisting of inter-related, non-linear phases of changes in "management model" (van Zon, 1996):

²² State-firm as opposed to firm-firm relations emphasized

- a political phase; the development of governing forces seeking a market economy,
- an early marketization phase,
- an inflation control phase
- a market institutions building phase
- an anti-recession phase economic policy phase
- and a growth policy phase

While one should not assume that transition is a linear, teleological process the above phases define the variety of conditions witnessed in the industrial systems of CEE countries including Poland. The particular configuration of these phases for Poland is governed by three elements - important determinants of the process of transition: the global economic system (or international environment), the broad domestic environment (including social and political system), and the national economic structure (with particular emphasis on intra-firm relations). With respect to the above three elements, transition in Poland reflects a movement to a type of hyper-capitalism in *cultural characteristics, ownership structures, and governance structures* alike. In particular, the first a massive wave of privatization that swept the Polish economy led to the subsequent rationalization of industry and closure of countless state owned enterprises. Second, this coincided with a shift in cultural values towards private ownership, increasing acceptance of economic individualism, with tolerance to a greater income gradient. Finally, a transition in governance models spelled the effective demise of vertical state-industry relations and removed the dependence of communities on the industrial combines. Perhaps ironically, these transitions coincided with the large-scale loss of jobs at the community level and indeed state-wide.

These three elements of the transition in Poland have in a way been part and parcel of “change management” efforts in the economies of Central and Eastern Europe (Stuetting, 2003). The objective of many so-called change management projects in Poland involved the purging of all socialist-era competencies as part of the transition process. The skills, assets, resources, and services from the socialist period were seen as impediments to the efficient productive organization in Polish Industry. While the lack of specialization or innovative capacity attributed to the socialist legacy is targeted for valid reasons, incentives for efficient production under state-socialism were actually not lacking completely (though they may have been rendered less effective by corruption and

bureaucracy). It has been shown that at both the organizational (firm), and individual (worker/manager) levels, survival in a distorted, socialist industrial environment in transition involved the deployment of different forms of motivation, incentives, and rewards, that while quite different from those practiced in a true market economy, were nonetheless in existence (Maruyama, 1993). These constitute the competencies of the socialist enterprise and should not be discounted. Jankowicz provides an example of these with specific reference to the skills of the manager in the command economy (Jankowicz, 2001, p. 51):

Table 3.2 Competencies in Socialist Management

General Skill	Negative Aspect	Positive Aspect
Focused coping skills	Concealing labour and material resources	Sophistication in annual budget negotiations where transfer of funds between “headings” is tolerated
Taylorist Rationality	Flight into inappropriate level of technical detail Irrelevant, expensive consultancy reports	Decisions informed by technical rationality Drive for efficient, standard operating procedures
Intuitive Skills	Inaccuracy in situations of uncertainty Avoidance of systematic monitoring and evaluation	Sensitivity to situational factors drawing on extensive expertise and experience Ability to justify the “big picture”
Networking skills	Venality, corruption and bribery “you scratch my back I’ll scratch yours”	Ability to access helpful power-holders, in the knowledge that the relationship is mutually obligatory
Stress-handling	Illness, especially psychosomatic Inaction due to excess role ambiguity	Tolerance, stamina, endurance Tolerance of ambiguity
Conceptual sophistication	Sophistry and dissimulation, cynical “spin doctoring”	Openness to nuance in verbal and written expression; openness and willingness to reconstrue

As this example illustrates, socialist era competencies and endowments can act as either barriers to, or facilitators of industrial transition. Unfortunately, in Poland the shift from state-socialism to capitalism culminated in the near complete annihilation of competencies responsible for a majority of the country’s industrial accomplishments this past century. While this purging may be in part necessary to allow the development of specialization and innovative capacity within Poland’s industries, a recognition of legacy

competencies should in no way prove harmful to the country's transition. Unfortunately, as will become evident from the empirical analysis foreign firms have little or no interest in integrating Polish industrial competencies into their operations in Poland.

DFI Inflows to Poland

One of the key drivers that shape the nature of economic transition in the former socialist states of Central and Eastern Europe is direct-foreign investment (DFI). Poland has led the transition economies of Central and Eastern Europe in FDI inflows since 1991 (Cieslik & Ryan, 2002). Between 1997 and 2001 alone, the country received on average nearly \$7 billion annually in inward FDI flows, and affiliates of foreign TNCs numbering over 4,000 were responsible for nearly 650,000 jobs in Poland by 2001 (UNCTAD, 2003). More significantly, by this time FDI stocks accounted for over 20% of Poland GDP and stood at over \$34 billion (PAIZ, 2002). While FDI inflows account for a greater percentage of total GDP in Hungary and the Czech Republic, the absolute share of FDI Poland receives is by far the largest in the region (Lill, 2001). Additionally, the volume of FDI has grown more than thirty-fold in the decade between 1991 and 2001, and four-fold between 1995 and 2001 alone (UNCTAD, 2003). Sources show that FDI inflows have declined somewhat between 2001 and 2003, and attribute this to the increased competitiveness of neighbouring economies (PAIZ, 2003). Interestingly, this decline has not appeared in all sectors of the Polish economy, and it is useful to consider the changing sectoral distribution of investment flows in recent years, as it bears directly on the motor-vehicle industry.

Until recently, the bulk of FDI flows into Poland have targeted the tertiary sector, but by the first half of 2003 over 50% of all FDI inflows were absorbed by the manufacturing sector, this figure growing by 19% over 2002 alone (PAIZ, 2003). In terms of the structure of the Polish economy, it is the manufacturing sector that is responsible for the highest proportion of jobs, exports, sales and profits, and for the largest contribution to the development of the regional economy. Furthermore, PAIZ shows (2002 and 2003) that as a subset of manufacturing, the motor vehicle industry received one of the highest proportions of FDI inflows in 2002, accounting for more than one-third of all investment in the manufacturing sector. Since auto makers have been

among the first western firms to invest in Central and Eastern Europe, the industry shows not only the largest cumulative FDI stock at over \$6 billion USD, but also the highest amount of planned investments at over \$900 million for 2003 alone (van Tudler & Ruigrok, 1998). From these figures it is evident that while the absolute level of FDI inflows to Poland may have waned between 2001 and 2003, the structural dynamics of FDI in the country are now favouring the motor vehicle industry specifically.

As of 1999, the largest actors in the Polish motor vehicle industry, Fiat Auto Poland SA, Centrum Daewoo Sp ZOO, Volkswagen Poznan Sp ZOO, General Motors Poland Sp ZOO, Renault Polska Sp ZOO, Opel Polska Sp ZOO, Ford Polska Sp ZOO, Skoda Polska Sp ZOO, Daewoo Motor Polska Sp ZOO, Volvo Poland Sp Zoo, Volvo Truck Polska Sp ZOO, and Debica represented between them, an astounding 12 out of the top 35 largest affiliates of foreign TNCs in Poland in 1999, with Fiat, Daewoo, and Volkswagen alone being the top three foreign affiliates in the country overall (UNCTAD, 2003). In terms of investment totals, by June 2000, Daewoo and Fiat made total investments of over \$1.5 billion USD each in Polish production facilities, with General Motors and its affiliates, Volkswagen, and Ford following behind (PAIZ, 2003). While these dynamics are changing rapidly, two points can be inferred from the current situation. The first is that the motor vehicle industry is a critical and growing component of Poland's industrial base in general, and its FDI inflows specifically. The second is that while FDI inflows into this sector are by far the largest of the CEE countries, the investment dynamics are relatively immature. It is only recently that a complement of some of the top automobile manufacturers has been represented in Poland. Furthermore, competition among them, the changing government policy relative to neighbouring economies, as well as expected entry into the European Union in May 2004 will all have significant impacts on dynamics in this sector. These factors make the motor vehicle industry one of the most significant and interesting in the country and warrant a detailed analysis of the changing investment patterns in this sector.

3.2.3 Integration with the European Union

The process of transition from state socialism to market capitalism in Poland is increasingly linked to the European Union, its economy, and its management trends.

This section explores the impact of Poland's accession to the EU and the respective changes in the production management systems of Polish manufacturing firms, as well as the significance of these management trends to foreign firms investing in the Polish economy.

With the increasing significance of the European Union as a coherent economic entity, the idea of common management practices within the member states is increasingly explored. Recent studies identify elements of management that appear to be common among leading European firms, and can be said to comprise a "European management model". The European management model can be said to comprise four key characteristics: 1) orientation towards people, 2) internal negotiation, 3) managing international diversity, and 4) managing between extremes (Calori & de Woot, 1994). In comparison to the US and the Japanese firm – the two types most studied systems – several differences are evident in the European model according to Calori & de Woot. First, the European firms often show a tendency towards the fulfillment of the individual and people are seen as an integral part of the firm, both organizationally and socially. In this sense European firms differ from not only their American counterparts, which tend to place more emphasis on profit over people, but also from Japanese firms, which place more emphasis on the collective and group identity. The European orientation is still very much on the individual, and there is less conformism than in both the Japanese and American contexts. This emphasis on a *humanist* orientation in management has advantages but also presents obstacles to Japanese-style management. First, the Japanese management system may prove to have significant positive implications for the Europeans in terms of teamwork and team-building. Second, in terms of labour negotiations, in Europe emphasis is placed on creating dialogue within the corporate structure as well as with external stakeholders. Here, the European model falls between the American system where power rests with a strongly hierarchical organization of management, and Japan, where decision-making and negotiation is complex and ideas often flow from the shop-floor level. In the stereotypical European firm therefore, management decisions come more slowly than in either Japan or the US and managers need specific skills to convince people to gain their involvement in an environment where authority is constantly questioned. The capacity to explain and to convince people, a

diplomatic aptitude, and leadership *style* over skills in management technique are all critical in the European context. In this sense, the European style of internal negotiation presents challenges to Japanese parent-subsidary relations, information sharing, grievance procedures, and labour union relations. Third, the geography of Europe and European markets necessitates a certain comfort or acceptance of diversity at many levels. In this sense, the European manager is typically more comfortable with dealing with diversity than his/her American or Japanese counterparts. With a respect for foreign cultures and decentralization in particular, the European market may be more welcoming of Japanese management ideologies than the American market. Decentralization in this case need not imply a weak corporate culture, but rather a localization of management development. In contrast to the Japanese model of parent domination over subsidiary, the European approach would see a lateral partnership between the two units. Organizational architecture may therefore differ considerably between Europe and Japan. Finally, the European management model can be thought of as “half-way” between the American and Japanese experience with respect to three dimensions of management: the relationship between the firm and the individual, management time frames (short vs long-term outlook), and the balance between individualism and collectivism in the workplace. In this sense, the European perspective may prove less difficult for the Japanese subsidiary than the US perspective, where Japanese practice is more often than not at odds with local management styles.

Two additional characteristics of the European management model, while less common for many firms, should be considered for their implications for Japanese subsidiaries: product orientation, and intuitive/informal management. For the Europeans, the positive side of product orientation includes excellence in engineering and product design, while the negative side includes a lack of customer and market focus. Product orientation implies focus on a tradition of craftsmanship and product quality. However, European firms are less market focused than their Japanese counterparts and less customer-focused than American firms. Accordingly to Calori and DeWoot, in America, customer is king, while in Japan quality and marketing skills have made many firms global leaders. The European firm can be said to fall between the two, with a focus on product quality but with underdeveloped marketing skills. Additionally, European firms

seem to prefer intuitive over formalized management practices, and compared to their American counterparts, European firms have little need for extensive written procedures for every contingency. The distinction with Japanese firms is subtle, because they practice both formalization in the form of written rules as well as oral communication. The key distinguishing features of the European firm in this case are its focus on empiricism and improvisation, in what may be considered “chaos management”, through agreement, dialogue, and conviction (Calori & de Woot, 1994, p.52):

In Europe there is more empiricism. If a nice opportunity is offered, it does not matter if the documents do not fit exactly with the standards, or with the rules in the manual, we will take the opportunity if we are tempted.

These slight differences in formal versus intuitive approaches to management may yield considerable consequences for Japanese subsidiaries in Europe :

Some Japanese transplants in Europe are more productive than some Japanese plants in Japan... This could prove that the sense of chaos [in the European management model] is not necessarily a bad thing (Ibid).

While characteristics of management in Europe obviously vary by country and by firm, general characteristics presented above have been found to be sound in recent empirical studies. For example, in testing some of these characteristics, Paulson et al. (2002) find that a common management model is indeed developing among European firms. Likewise, Polish firms seem to reflect many of the European management system characteristics. Carlin *et al.* (2000) compare the four main characteristics discussed above for Polish, Spanish, and Hungarian firms and measure the extent to which transition of management models has taken place in those countries. From their results, it appears that the extent of integration with the EU management model varies by country and is roughly in line with the extent of compliance with the country's *acquis communautaire* as a whole (Bergman *et al.*, 1999; Carlin *et al.*, 2000). According to these findings, Polish industry has indeed integrated a significant proportion of EU management characteristics into its fold. The role of EU accession progress is particularly significant, and Poland has gone through an adaptation process that brought it closer in-line with EU parameters, including European forms of management, throughout the past decade (Weresa, 2004). Furthermore, research suggests that firms that exhibit European management practice

show performance that is superior compared to firms that do not exhibit European management characteristics. Therefore, an orientation towards people, internal negotiation, international diversity, and management between extremes, as well as product orientation and intuitive management styles are useful proxies of a *European management system* (EMS) in the same way that characteristics common to leading Japanese firms presented in the first section of this chapter are proxies of the *Japanese management system* (JMS).

The modern Polish manufacturing firm can therefore be viewed as managed under a combination of socialist legacy and European management characteristics. While this the process of transition from one type of management to another is ongoing, the influence of both the socialist and western European management is tangible and continually relevant. Therefore, in consideration of the socialist legacy, the transition to a market economy, and more recent integration with the European Union, the Polish management system (PMS) may be characterized as presented in Table 3.3 (Burton *et al.*, 1996; Lessem & Neubauer, 1994; Whitley, 1992).

Table 3.3 Characteristics of a Polish Management System

Layer	Element	Socialist Influence	European Influence
Shop-floor (1)	Job classification	Typically many detailed job classification with considerable power vested in the foreman	Relatively extensive job classification system, more flexible than US model
	Job rotation	JR is practically nonexistent	Job rotation increasing due to "humanist" focus
	Education/ Training	On-the-job training occurred largely on the basis of apprenticeship training; technical qualifications revered.	Emphasis on investing in employees – extensive training, but often not firm-specific
Factory (2)	Promotion	Worker promotion based primarily on length of service.	Flexible promotion criteria – "whole worker valuation" – length of service still important
Shop floor (1)	Equipment	Production equipment from CMEA suppliers, little success in integration of foreign technology	Strong supply base within EU
	Quality Control	Statistical quality control techniques dominant. No emphasis on "quality-built-in", no	Mix of practices, increasing interest in Japanese QC practices; empiricism

Layer	Element	Socialist Influence	European Influence
		QC circles.	
	Maintenance	Technical experts and engineers within the facility. Technical qualifications revered – little shop-floor worker involvement.	Emphasis more on integrating technicians and workers, less shop-floor involvement than in Japan, but very experiential
Factory (2)	Operations Management	No special arrangements to cope with line failures or defects (little coordination and cooperation among supervisors workers – usually in the form of blame; low product mix, practically no product change	Product orientation, management by chaos and reliance on intuition – supported by empiricism. Flexibility still behind Japanese example, but strong emphasis cooperation over efficiency
Factory (2)	Local content	Content sourcing determined by availability of supply from within CMEA (supply constrained)	Partnerships with local suppliers highly encouraged (within EU) – suppliers tend to follow manufacturers with investment
	Procurement	Materials and parts procured from within CMEA (politically controlled)	Procurement according to market and on global basis
	Procurement method	Local suppliers are not held to strict observance of delivery times, no arrangements made to reduce parts inventory, technological assistance is negligible, but long-term contracts are applied to suppliers and other partners in combine.	Groups of companies commonly collaborate on projects, sharing information, technology – long term relationships often reach beyond contract, JIT inventory control practiced where desirable
Corporate (3)	Small group activities	Very little small-group activity	Team work more common than in US, but not as extensive as the Japanese
	Information sharing	Information is seen as a key asset and held in confidentiality – little communication of actual circumstances to workers	Information seen as critical to the perseverance of the firm – rooted in empiricism
	Sense of Unity	Sense of unity implied through broader socialist political and economic ideals rather than corporate identity	Sense of unity promoted on the basis of common values rather than corporate identity or political goals
Factory (2)	Hiring Policy	Labour shortage means little discretion in hiring	Emphasis on long-term employment and personal development
Corporate (3)	Job Security	Long-term job security near guaranteed	Job security idealized and strongly defended by unions – some penetration of “flexibility” and reduction of benefits
	Labour Unions	Widespread unionization with	Widespread unionization, but not

Layer	Element	Socialist Influence	European Influence
		potent impact on industries and significant political weight	in the form of corporate unionism
	Grievance procedures	Supervisors or foreman have significant power, blame routines persist among shop-floor workers	Internal negotiation emphasized
	Delegation of authority	State – industry tie up for strategic decision making. Very little formal independence for local operations as quotas must be met; however, room for manoeuvring for the inventive manager	International diversity respected within corporate structure – relatively large subsidiary autonomy expected (within EU)
	Community relations	Industry holds local communities “over-the-barrel” and has considerable influence over local affairs	Respect for communities implicit in corporate plans

3.3 CONCLUSIONS

In this chapter Japan and Poland were examined from the point of view of donor and host economies in the context of international production. Accordingly, the management systems of Japanese and Polish manufacturing firms have been compared. The Japanese management systems was presented as a set of layered characteristics common within the shop-floor, factory, and corporate areas of the best Japanese manufacturing firms. The characteristics of this system was said to also be determined by the institutions, cultural patterns as well as factor input of the Japanese economy, which formed the outer layer of the JMS model. On the other hand, the Polish system has been influenced by three main factors: the legacy of state socialism – and the resulting lack of specialization; the rapid transition to capitalism – and the rejection of socialist-era competencies; and integration with the European Union – along with the introduction of European management methods. Investment inflows from foreign firms have played a critical role in Poland’s transition. As Japan expands its share of inward DFI in Poland, the behaviour of Japanese firms will become increasingly important to Polish industry.

CHAPTER 4: CASE STUDIES OF FOUR PRODUCTION SYSTEMS

This chapter focuses on adaptations made to the production systems of four Japanese subsidiaries in the Polish auto manufacturing industry. In particular, the chapter focuses on 23 characteristics of the Japanese management system, and how these have been modified to suit circumstances in Poland. These characteristics belong to six groups of competencies common in the Japanese factory (Abo, 1994). The groups include work organization and administration, production control, procurement, labour relations, group consciousness, and parent-subsidiary relations (see Table 3.1). These six categories form the organizational framework for this chapter.

Japanese firms entering Poland are subject to significant barriers to entry. While Poland has a long industrial tradition, it differs considerably from Japanese practice. Furthermore, Japanese experience in Poland is extremely limited. Of the four case study firms all have been operating in Poland less than seven years. The transfer of the Japanese management system to Poland is therefore a rather new experiment. How Japanese competencies clash with or complement Polish institutions has so far been unexplored. This chapter provides evidence through excerpts from interviews with senior management of how Japanese practice has been adapted to circumstances in Poland. Interviews with Toyota, Isuzu, Denso and Toyo confirm that hybridization of the Japanese management system is indeed occurring in Poland. In the words of one manager:

We only have elements of the Japanese system here. Because, the clash of local culture and Japanese culture, only some elements were transferable: these are the uniform matters, the technological matters, the quality control solutions – these are only elements. Then again other elements: [In Japan] first they sing the anthem, then they exercise, then they have a first meeting, so 15 minutes went by.

They work 8 hours, then they have a short break, and these same people work another 4 hours. This is the Japanese style. Frankly, the operation works 24 hours but there are only 2, 12-hour shifts. Here, these things could not be

transferred. So these cultural factors tied with Japan have been cut out here (Interview #2).

The bulk of this chapter is dedicated to illustrating exactly how elements of the Japanese management system (JMS) are becoming adapted to circumstances in Poland. Wherever possible, excerpts from interviews with senior management are provided to illustrate the barriers experienced by the firms, and the strategies they are enacting to overcome these barriers.

4.1 WORK ORGANIZATION AND ADMINISTRATION

Practices and procedures within the work organization and administration group of production system elements showed perhaps the most consistency with Japanese practice among the four case firms, with the exception of Denso Manufacturing. Generally speaking, the other three facilities followed the Japanese model fairly closely. This is surprising because previous research suggest that work organization and administration practices and procedures are typically one of the first to be adapted to local circumstances and therefore the first to diverge from Japanese practice (see in particular Abo, 1994; Babson, 1995).

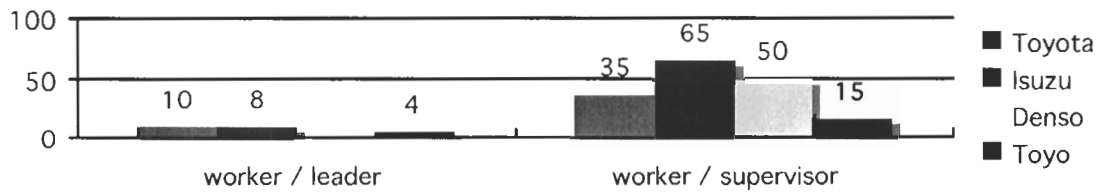
Job categories - With respect to job categories, all four plants showed little formal separation of tasks into many job titles; that is, work on the shop floor was carried out by one or at most two categories of workers across all four firms. The most common formal separation of worker categories was along the lines of team member, team leader, and group leader, and maintenance workers. The team member, or production line worker, was in some cases further separated into production worker and maintenance worker. Typically, the role of the team leader is hands-on directions of a team of workers or operators, the resolution of technical problems and communication with the supervisor above him/her. For Isuzu, the basic worker category is the “operator”, where for every 6 to 10 of these operators there is a “team leader”. Furthermore, there is a “foreman” or supervisor who directs the work of 8 teams, or roughly 50 – 80 production line operators in total per supervisor.

Table 4.1 Work Organization and Administration

	TOYOTA	ISUZU	DENSO	TOYO SEAL
Job classification	The facility has two basic job classifications of 1) production team member, and 2) maintenance team member.	The facility has two basic job classifications of 1) production line worker, and 2) maintenance worker	The facility has only one basic job category comprising production workers. The tasks that these workers perform are diverse however.	There are 2 categories of workers on the production line: 1) production worker, and 2) inspection worker.
Wage System	Currently, job classification is the most important factor in determining wages for several reasons. First, the facility is still in its infancy and as a result seniority has not yet developed. Second, while management plans to increase the importance of performance evaluations in the near future, these do not currently impact wage levels in a significant manner.	Performance evaluations are the deciding primary factor determining wages. The facility has only been in operation since 1999, length of service is not yet an important wage determining factor. The facility runs three worker shifts which have been built in batches. Accordingly, the first shift of workers currently has the most seniority and receives the highest pay.	While performance evaluations are employed, the complexity of the task that a worker performs is the main determinant of wages. While this is not reflected in a complex job classification system, wages are still functionally differentiated.	Management overtly states that the wage system is the same as in Japan and is "individual based". Because the facility is new, length of service is not yet as important as performance evaluations.
Job Rotation	Job rotation occurs mainly with the purpose of reducing the monotony of repeated tasks. Rotation is planned and occurs at two hour intervals. While rotation is used to reduce monotony of the production line, the broader objective is to train multi-skilled workers that can operate any process in the facility and the anticipated expansion areas as well.	Job rotation occurs mainly with the purpose of reducing the monotony of repeated tasks. Rotation is decided by team leaders and/or supervisors and occurs in an ad-hoc fashion without extensive planning. There is no overt promotion of multiple skill development.	No team-work in the Japanese sense exists. Work is done in a strictly linear fashion by compartmentalized workers along the production lines. Job rotation occurs only in the case of a select group of workers who work between the two production lines. The purpose of this limited job-rotation is purely to take advantage of the skills of the very best workers when they are needed at other stations.	Job rotation is non-existent at this facility. Management states that due to the small size of the operation JR is not necessary. However, they also state that even in light of significant expansion plans, no job rotation is in the works.

	TOYOTA	ISUZU	DENSO	TOYO SEAL
On the job training	<p>OJT is the primary training method. Outside training is used where required, especially for maintenance personnel who may require licenses.</p> <p>All workers receive a week of pre-job training, but this is used purely to satisfy regulatory requirement in Poland.</p> <p>Maintenance workers, team leaders, and group leaders are selectively dispatched to TMC in Japan for training.</p>	<p>Although there is no emphasis on training multi-skilled workers, OJT is the primary training method. In addition, a select group of workers has been selected (on the basis of PE) to train in Japan for a period of several months.</p> <p>In addition, there are dedicated training areas within the facility that deal with new workers. When the facility first opened, a group of experts from Japan provided initial training on site.</p>	<p>The facility has been in operation for over a quarter century, and consequently has a very experienced workforce. Most new workers are hired on a temporary basis to meet numerical flexibility requirements.</p> <p>These workers receive some basic OJT required to safely perform the simplest manual tasks on the production line.</p>	<p>OJT is the only form of training workers receive. There is a 3-month probationary period during which time new workers are expected to learn the job they will be performing.</p> <p>The exchange of workers, team leaders, etc between this facility and Japan is extremely limited however, and there is little emphasis on training multi-skilled workers.</p> <p>All training that is required is conducted within the facility or at least within the firm.</p>
Promotion	<p>Team leaders and group leaders (supervisors) are recruited from within the production worker pool as much as possible, and on the basis of seniority and PE; however, where there is a shortage of human resources, supervisors may be brought in from outside (Japan)</p>	<p>Initial supervisors were brought in from Japan when the facility first opened. When subsequent shifts were built, the best workers from the first shift were chosen to become supervisors on the basis of PE.</p>	<p>Small labour force means that promotion is very infrequent; however, when it occurs it is on the basis of experience and performance. If resources are not available within the facility, experienced workers will be hired from outside.</p>	<p>Team-leaders and supervisor are promoted from within shop-floor workers. Promotion is determined by performance evaluations. Again, length of service is not an important factor due to the youth of the facility.</p>

Figure 4.1.1 Worker / leader (supervisor) ratios



At the Toyota facility, there are 10 “team members” for every “team leader”, and three to four teams per “group” leader, who in effect fulfills the same supervisor functions of Isuzu’s “foreman”. Interestingly, the Toyota facility demonstrates the highest team leader and supervisor to operator ratio of the four facilities. At Toyo Seal, there are 4 to 5 production team members under each team leader, and there are 3 team leaders, 20 inspection team members under one team leader, and only 1 production supervisor. Finally, at Denso manufacturing, all workers fell under one category of “production worker” and they were under the supervision of a single “foreman”.

The range of tasks performed by a category of workers also varied by firm, though there is less information available at this detail. In all instances however, and clearly a result of few job categories, workers performed varied tasks, and in this sense job categorization practices seemed very much in line with the Japanese system at all four facilities. However, few job categories does not necessarily mean that workers are multifunctional, as shall be seen in the section describing rotation systems. Of particular significance is the separation of production and maintenance workers.

Wage system - The wage system varied considerably by firm, although three out of the four firms did show elements of Japanese style performance evaluation being used to determine wage levels. Typically in Japanese facilities of the type studied in Poland, length of service as well as performance evaluations would be used to determine wage levels for production workers and maintenance workers. A major factor confounding substantive analysis of wage determinants is the length of operations, since three out of the four facilities have been in operation for less than 5 years.

Nonetheless, at Toyota, length of service was the most important determinant currently, with the first intake of workers now earning more than newer workers from subsequent intakes. Management did however express considerable interest in increasing the weight of performance evaluation in order to bring the facility in line with facilities in Japan, but stressed that this will develop in time, and that currently this may be inappropriate considering that workers are new and still very much “learning”.

Interestingly, Isuzu takes a different approach in that performance evaluations are “decidedly” the most important factor in determining wage levels of production workers even though the facility has only been in operation for one year longer than Toyota’s. The practice was similar at Toyo Seal, where performance evaluations weighed heavily even though this is the most recently established of the four firms.

Finally, Denso Manufacturing emphasized length of service, although the biggest wage determinant here was between temporary and permanent hires, especially since nearly half the workforce is composed of temporary workers. Aside from length of service and performance evaluations, job category was an important determinant of wage levels. In particular, maintenance workers consistently earned a higher starting wage than production line workers:

Production workers...and the maintenance, those workers wages not even because maintenance always in...in more demand (Interview #1).

In summary, the four facilities showed more adaptation in terms of wage systems than they did in job categories, although performance evaluations remained a considerable determinant in all but one case.

Job Rotation - The Job Rotation element showed more divergence from Japanese documented practice than would have been expected, with the exception of the Toyota facility. At TMMP, the job rotation system largely lives up to what is known about the Toyota Production System. Rotation of workers occurs at the level of the team, and in 2-hour cycles:

One person operates one spot on the assembly line and after 2 hours of operation he changes into the other side, just assembly line, to just supplying the parts (Interview #1)

The stated objective of such worker rotation is to reduce monotony or the stress on workers from carrying out repetitive tasks. Basically, two or three teams of workers rotate (as a team) between the various tasks that comprise a group. This group could include machining, assembly, and parts supply tasks and during a day each worker would have the chance to participate in each of the tasks at least once, while the specific pattern of rotations is controlled by the group leader²³. Because the facility is so new there is not much indication of rotation for the purposes of multi-skilling workers, although management has stated that such objectives are clearly part of the Toyota philosophy. At Isuzu, job rotation also occurs for the purposes of reducing monotony, but there is a “limited tolerance” for such rotations (Interview #2). Actual rotation

is determined by several factors. There are rotations that are easy, and others are hard, and on the basis of this the rotation is sometimes done two times per day and sometimes once per week, so there are no guidelines, and this decision falls on the foreman (Interview #2).

Clearly, Isuzu sees no benefits arising from rotation aside from the creation of a less monotonous working environment. At Denso, job rotation is even more limited, and occurs only with respect to the most skilled workers, who at different times of the day may be required at various stations, and consequently, they perform various task. However, there is no general job rotation system that applied to the workers. The situation is similar at Toyo Seal where job rotation is not practiced at all. Management states that this is because “the production team is very small” (Interview #4); however, they also have no plans to implement job rotation if the facility grows.

In general, with the notable exception of TMMP, the subsidiaries showed lower than expected levels of job rotation, with rotation systems of any kind were practically absent from two of the four facilities. Only TMMP showed any sign of rotation being used as a tool to support multi-skilling of the labour force.

Training - Training practice varied across the four firms, but was generally broken down into four distinct categories: internal, external, pre-job, and on-the-job. In general it appears that job category was the greatest determinant of training type received (Figure 4.1.2).

²³ group leader = supervisor

Figure 4.1.2 Types of training for factory workers

	Internal	External	Poland	Japan
Production	YES	NO	YES	NO
Team leaders	YES	NO	YES	YES
Maintenance	YES	YES – licenses	YES	YES

For Toyota, nearly all training took place within the boundaries of Toyota Motor Corporation, although advanced training was undertaken in facilities in Japan itself, rather than the subsidiary in Poland. Internal training consisted of a week-long initial period, required by Polish law, that familiarized new workers with health and safety regulations, basic operating procedures, house rules, and perhaps significantly, explicitly with the Toyota Production System philosophy. The emphasis however is on on-the-job training, and the introductory weeklong training period serves to fulfill legal obligations more than to prepare workers for the production line. The objective of Toyota's overall training program is three-fold: to meet license related obligations, to develop the competencies of team leaders and group leaders, and to explore the potential of individual workers. Where this cannot be done within the Polish subsidiary, training takes places in Japan:

Some team leaders and group leaders have a chance to go, because of course they are, they should learn to, how to manage the line, and the maintenance people learn different things. Maintenance people should develop their skills and experiences within TMC, because TMC maintenance guys has heaps of experience, 40 years experience at the most, at the top, so why not to learn from them. That is a very convenient way for us to improve our skills and experience (Interview #1).

As shown in this quotation, maintenance personnel require and receive more extensive training, mostly in the form of on-the-ground training in Japan, as well as external training in Poland, in the case of licenses and tickets.

Similarly, Isuzu provides both pre- and on-the-job training. The initial training consists of:

A training area with sample machinery and engine components, where workers become familiar with tools, technology and documentation and can train in certain tasks...under the supervision of a trainer (Interview #2).

This initial stage lasts a week, yet again fulfills legal requirements. The second stage concerns:

...on-the-job training, involving work at a particular position on the line, leading up to full capabilities. The worker first works with someone who is experienced, and then this experienced person transfers tasks to the trainee. This process lasts up to three months maximum (Interview #2).

Here, the practice at Isuzu differs from Toyota, where on-the-job training is considered an ongoing, continuous process that does not terminate after any pre-determined length of time. In contrast, it appears that at the Isuzu facility, on-the-job training concerns the development of basic worker skills rather than continuous improvement. Nonetheless, Isuzu seems to have taken training in Japan to greater lengths than Toyota:

A huge number of people went to Japan – when we were in the initial phase of operations in 1998, 80 people went and worked in the same facility in Japan. And they underwent initial intensive and famous training, because costs were huge, and they were able to familiarize themselves with Japanese culture as well. This was the group of people that today is at the higher, better positions (Interview #2).

Obviously, there was a strong desire to emulate Isuzu's Japanese training practices at the Polish facility. At Toyo Seal, it appears that the initial training period required by Polish law is simply rolled into a three-month probationary period during which time the worker undergoes on-the-job training, and if successful, remains at the facility. Similarly to Isuzu, the training seems limited to developing the skills of the worker to a certain point, after which training terminates and the probationary period expires. Finally, Denso demonstrates the least sophisticated training system, whereby management counts on the extensive experience of a few existing veteran workers²⁴ to train temporary workers, who are hired to meet numeric flexibility requirements. There is some support for external certification and training, but in reality little such training takes place, as the facility is not hiring any new permanent workers.

In summary, the training practices and procedures at the four subsidiaries range from Toyota, which most closely emulates documented Japanese practice, to Denso, which has little in common with Japanese practice. Interestingly, while both Isuzu and

²⁴ Some workers have over a quarter-century experience at his facility

Denso stress the significance of on-the-job training, this is not a continuous process for them, unlike at Toyota, where on-the-job training implies a continuous learning process. All four facilities stress the importance of training of all forms for maintenance workers, and prioritise on-the-ground training for team leaders and group leaders/supervisors where practicable, with the exception of Denso, which has no ties with the Japanese parent.

Promotion - Systems of promotion across the four subsidiaries are fairly closely related to documented Japanese practice. For example, at TMMP, promotion is largely internal, across job categories, from production worker to team leader, to group leader.

We do like to promote within, however... we do like, however; there is some lack of resources, especially in the case of our new project... in such a case, its not within our resources, its not enough, so we recruit from outside, group leader, team leader (Interview #1).

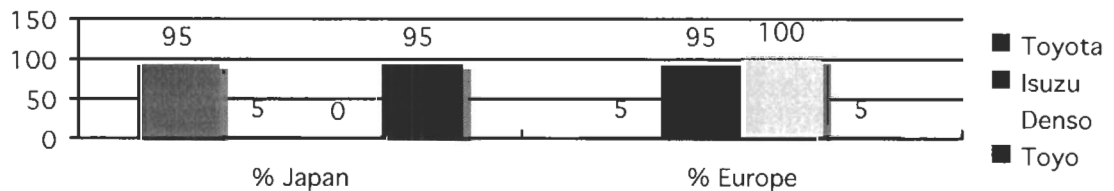
Furthermore, the decision of who becomes promoted is determined by a combination of factors including length of employment and performance evaluations, as well as experience in a particular production process. Lack of experience in the latter within the existing workforce is the primary reason why the facility has to resort to external hiring of leaders during the expansion phase. For Isuzu, performance evaluations are “decidedly” the main factor influencing promotions (Interview #2). Here too, promotion is largely from within the workforce and involves the vertical movement of employees from production to leadership and supervisory roles. Neither Denso nor Toyo Seal actively practices promotion to any significant extent, due primarily to the small size of their operations. However, Toyo Seal has emphasized the importance of performance evaluations as a factor in the promotions of existing supervisors and team leaders, all of who have been recruited from among the production workers. By contrast, Denso focuses primarily on the recruitment of experienced workers, and this is largely from outside the facility, likely as a result of their limited training program, which limits the pool of highly skilled staff on hand.

4.2 PRODUCTION CONTROL

The production control group includes the equipment, quality control, maintenance, and operations management practices and procedures common to the Japanese management system. Most significant is the finding that the desire to apply Japanese maintenance practice precisely has in part caused the cross-adaptation of production control through the introduction of less automated production lines (Table 4.2). This shift to more manual labour has in turn been facilitated by the relatively low wages of Polish production line workers²⁵.

Equipment - Sources of production equipment varied widely among the firm, and this was perhaps the most surprising element in this respect. For example, while Toyota and Toyo Seal acquired the vast majority of its factory equipment and supplier from Japan, Isuzu had Japanese headquarters forward technical specifications to a German firm that supplies Opel assembly operations, and it was this German firm that furnished this facility with equipment. As a consequence, Isuzu was a surprising find with nearly no Japanese-sourced equipment in the facility. Similarly, since the acquisition of the facility by Denso Manufacturing, the factory has no Japanese equipment of any kind.

Figure 4.2.1 Equipment sources



²⁵ Wages were in salary form and ranged from a high of 2600 PLN / month to a low of around 1200 PLN / month (approx. 1200 CAD to 500 CAD)

Table 4.2 Production Control

	TOYOTA	ISUZU	DENSO	TOYO SEAL
Equipment	Nearly all of the production line equipment comes from Japan.	All of the production line equipment comes from a German firm. Isuzu in Japan provided the specifications to this German supplier.	All of the production line equipment comes from Polish and Italian suppliers. The production is not automated and required little if any advanced machinery.	Almost all of the production line equipment comes from Japan.
Quality Control	<p>Quality Control is a 2-step process in this facility, meaning that QC check is performed on the line at the receiving point and in-process point of each process.</p> <p>Management strongly emphasizes the goal of 100% in-process quality control, and seeks to continually reduce the need for the post-production QC stage.</p>	<p>Every tenth operator on the production line is in effect an in-process QC specialist. Most operators are directly responsible for QC.</p> <p>In addition, the facility has an extensive testing area where precise QC is conducted on finished product.</p> <p>There is less emphasis on 100% QC built-in, but management insists local system matches parent facilities completely.</p>	<p>Quality Control is carried out using "tried and tested" statistical sampling procedures.</p> <p>There is no emphasis on 100% in-process quality control or quality "built-in" principles.</p>	<p>There is some emphasis on in-process QC, and each worker is responsible for not passing a defect product to a subsequent station.</p> <p>However, there is also a dedicated inspection team that plays a major role in QC at this facility.</p>
Maintenance	<p>Inexperienced maintenance workers are hired separately from production workers. Preventative maintenance is strongly emphasized and all employees have some role.</p> <p>Engineers are brought in from Japan where necessary.</p>	<p>Experienced workers hired separately but receive additional internal training before being promoted to maintenance personnel; shop floor workers do not have any significant commitment to maintenance, aside from running a "clean" station.</p>	<p>Maintenance is performed by a very experienced maintenance specialist. Maintenance tasks are normally not the sphere of production workers aside from very minor issues. There is little or no emphasis on preventative maintenance.</p>	<p>Maintenance is performed by three workers (out of 50) on the production line. These maintenance workers have been promoted from among the production workers on the basis of performance evaluations.</p> <p>None of these workers have previous experience.</p>

	TOYOTA	ISUZU	DENSO	TOYO SEAL
Operations Management	<p>Work manuals were brought in from UK sister plants, where they have already undergone significant adaptation to "European" conditions.</p> <p>Preventative maintenance, fail-safe devices, and production signal board are all used.</p> <p>There is a strong emphasis on expanding product mix and bring production control completely in-line with Japanese sister plants in this respect.</p>	<p>Work manuals are functional equivalents of Japanese manual and were not obtained from Japan.</p> <p>There is some emphasis on local job improvement but the extent of its impact on operations management appears negligible.</p> <p>Small lot production is employed; however, differences between product models in the mix are limited.</p>	<p>Experienced workers hired separately but receive additional internal training before being promoted to maintenance personnel; shop floor workers do not have any significant commitment to maintenance, aside from running a "clean" station.</p> <p>There are no provisions for dealing with line failures, partially due to the low level of automation in the facility. Local quality control and maintenance specialists are responsible for updating and improving on procedures, and these are recorded in detail. These operating manuals represent more than 20 years of experience at the facility and have nothing to do with Japanese practice.</p> <p>Product mix is low and product change is infrequent, and production is done in large lots. Some type of machine fail-safe devices are used, but no production signal is in place.</p>	<p>Three maintenance engineers from Japan are currently working at this facility although the goal is to phase out Japanese personnel.</p> <p>Operating manuals were brought in from sister plants in the UK. Some further adaptation to local circumstances was undertaken.</p> <p>This facility currently produces just one main product, in 12 different models. These models are produced using small-lot methods.</p> <p>Although production technology (Andon, Pokayoke, etc) is employed, job improvement is very limited, as quality control circles are just beginning to be explored.</p>
Job classification	The facility has two basic job classifications of 1) production team member, and 2) maintenance team member.	The facility has two basic job classifications of 1) production line worker, and 2) maintenance worker	The facility has only one basic job category comprising production workers. The tasks that these workers perform are diverse however.	There are 2 categories of workers on the production line: 1) production worker, and 2) inspection worker.

Quality Control - Quality control is a complex system of practices and procedures. This element shows a wide range of variation across the case study firms with the TMMP facility most closely emulating Japanese practice, and the Denso and Isuzu facilities showing the greatest divergence.

TMMP's quality control network is divided into two parts: the source area, for example machining, and the processing area, for example assembly. Across these two areas, a two-point quality control system is in effect: A person is getting a part to process that part, and the person after that person always getting that part and check outcome of the machining and to process his own processes, so it always a combination of processing and checking, processing and checking (Interview #1).

In addition to this *in-process* quality control, the facility has quality control checkpoints, although management seeks to reduce these continuously:

Our ideal situation is to 100% realize of the quality assurance within the process itself, because we are have process and checking, process and checking, within the line [...] if this is working 100% well, then the outcome is always perfect, but its not real story nowadays, so we should have another checking process at the end of the line. [Quality-built-in] is just one of the philosophy of the Toyota production system (Interview #1).

Clearly, the focus is on in-process quality control at Toyota and management works to reduce the need for end-of-the-line QC checks as much as possible. In addition, TMMP emphasizes the role of quality-control circles and other tools that empower production workers in the quality control process. The situation is similar at Isuzu where both in-process and QC checkpoints are employed:

Control is 100%. Each operator is responsible for quality. Accordingly, every 10th station is a quality control station, which checks the work of the operators. And there are about 10 of these (Interview #2).

Additionally, *kaizen* circles have been in operation since start of operations and are seen as an important QC tool. Furthermore, management is adamant that the QC system used at this facility is *exactly* the same as that used in Isuzu's Japanese facilities. This is an interesting find because seemingly there was less emphasis on 100% quality built-in here than at TMMP in the sense that management showed little interest in eliminating QC checkpoints. Perhaps this is testament to the heterogeneity in the Japanese Management System across different Japanese manufacturers.

Again, at Toyo Seal, in-process quality control is seen as important, where:

Basically each person should not give any unqualified product to the next person (Interview #4).

However, there may not be any formal system for dealing with in-process quality control, or of aiming to eliminate end-of-the-line quality control checkpoints. In addition, management has stated that defect rates have been slightly disappointing, although quality control circles have been initiated, but only recently and possibly as a response to QC problems. This facility does not score as highly because it seems while responsibility for quality is assigned to production workers, they have little authority in directing QC activities, which are the realm of the head supervisor. Meanwhile, Denso demonstrates no in-process quality control practices and procedures, and instead maintains an extensive catalogue of statistical quality control methods and procedures that are applied in the production system.

The quality control element is perhaps the most difficult to analyze for hybridization through adaptation to local context, because it seems that the practices of the Japanese parent under which these subsidiaries operate vary somewhat with respect to QC. In any case, there is a clear gradient from Toyota and Isuzu that come closest to home practice, down to Denso which shares little with Japanese QC methods.

Maintenance - Maintenance practices and procedures make up a very important part of the Japanese management systems and three out of the four subsidiaries show considerable effort in this area.

At TMMP maintenance workers were hired as a separate inexperienced pool.

In the case of the maintenance workers we are much more interested in the specific knowledge, skills, experience and also the license (Interview #1).

Wherever necessary, maintenance was carried out by engineers from TMC Japan parent facilities; however this was only in circumstances where local resources were insufficient. The facility generally does not seek outside help from third-parties in maintenance activities, and preventative maintenance by all production line workers is under implementation. There is a strong emphasis on developing in-house competencies in maintenance through a skills transfer and training program in Japan:

Maintenance people should develop their skills and experiences within TMC, because TMC maintenance guys has heaps of experience, 40 years experience at the most, at the top, so why not to learn from them, that is a very convenient way for us to improve our skills and experience (Interview #1).

Therefore, while a shortage of skilled maintenance personnel knowledgeable in the Toyota system is a definite reality within this subsidiary, the Japanese maintenance methods are not compromised, and assistance is internalized within the firm. Of critical importance however, is the fact that this facility is less automated than Japanese sister plants, and this in large proportion is a result of a lack of experienced maintenance personnel that are required for complex automation to run smoothly. Interestingly, Toyota has chosen to adapt their automation levels and to hire more workers rather than compromise maintenance systems. Similarly, Isuzu stresses preventative maintenance and hires maintenance workers with no experience directly into the pool of labour. Again the internal development of maintenance competencies is important and little if any maintenance, is performed by third parties:

Generally, we put emphasis on internal development (Interview #2).

Yet again at Toyo Seal, inexperienced workers were hired separately, and have been trained internally. The facility also has access to three experienced Japanese maintenance engineers who solve larger technical problems. Just as with Isuzu and Toyota, Toyo Seal seeks no third-party maintenance solutions. Finally, Denso is an example of the polar-opposite case, where periodic troubleshooting takes the place of preventative maintenance, and where one experience maintenance specialist handles this area and where production workers have no involvement in maintenance activities.

The most important finding with respect to maintenance practices and procedures is that the subsidiaries (Toyota, Isuzu, and to some extent Toyo) view the preservation of this element of the JMS so critical that they are willing instead to modify the automation levels in the facility rather than adapt maintenance practices and procedures.

Operations management - Operations management includes a wide range of practices and procedures including production line setup and arrangements to cope with line failures or defects (e.g. coordination and cooperation among first-line supervisors and team leaders, preventative maintenance, machine fail-safe devices, production

control signal board; standard procedures and work manuals, line balance adjustments, product mix, and die change times.

Toyota, the leader in this group, brought work manuals in from sister plants in the United Kingdom in order to enable easier implementation of Japanese practices in an European context. The TMMP facility employs all typical elements in a Toyota production facility including fail-safe devices, and production signal boards. Although the facility currently only produces one type of product, with six to eight models, the product-mix will soon grow rapidly with an expansion project encompassing casting and engine manufacture:

In the case of the engine and transmission, we cannot produce on the same line because the machining process and the parts are completely different, so and also the casting is a different process, so we are developing a different plant (Interview #1).

In the case of Isuzu, the parent firm's production system was transplanted completely according to management, but even though the facility produces several slightly modified models of engine, these are not run on the line at the same time, but rather in batches, in contrast to the situation at Toyota.

The "lot production" system is employed, and depending on the type of engine, the lot is standardized. Sometimes this means 100 engines of one type together, sometimes this is 50, and when they pass then the next model is scheduled.

We try to minimize the size of the lot because this increases flexibility and ensures that production can always be on schedule, and there is no need for downtime (Interview #2).

However, it appears that there was room for greater product mix and perhaps smaller batches, and that this was slightly out of line with the Japanese parent. Yet again, there is the possibility that this simply reflects differences between the production systems of Isuzu and Toyota Motor Company in Japan. While Toyo Seal also employs common production control elements including the *andon* and *pokayoke*, and have brought work manuals in from sister plants in the UK just like the case of TMMP, workers possibly have less line-stop authority, which rests with the supervisor. Finally, Denso shows absolutely no elements of the Japanese management system with respect to operations management. The low level of automation at the facility means that there are

no specific provisions for dealing with production line failures. While local quality control and maintenance specialists are responsible for operations procedures, the focus is very much on engineering processes. Furthermore the product mix is low with a few models of a very simple products²⁶ and production is carried out in large sequential lots. Significantly, the operations management element of the Japanese management system has been limited in application because three of the four facilities are recent establishments. Accordingly, training is in many cases not complete, skills are not built up, and expansion projects often underway, meaning that product mix may be relatively immature, and multi-tasking limited. It is likely however, that the location of the subsidiaries in Poland bears little impact on the application of operation management practices and procedures per se.

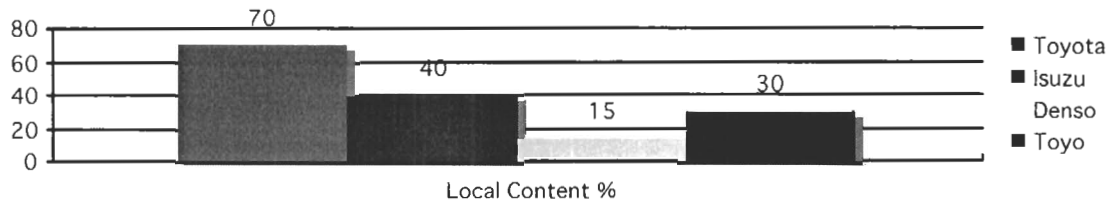
4.3 PROCUREMENT

The procurement group of practices and procedures includes the amount of local content used in the subsidiary's production process, the source of suppliers, and actual method of procurement. This group showed the lowest application of Japanese practices (Table 4.3).

Local Content - Local content refers to the ratio of supplies manufactured in-house and varied widely across the four facilities. The Toyota facility demonstrated surprising results with a considerable majority of supplier manufactured in-house. Isuzu showed near even distribution of in-house production, and external sourcing, with Toyo Seal showing the highest dependence on Japanese –sourced parts.

²⁶ Windshield wiper arms and motors

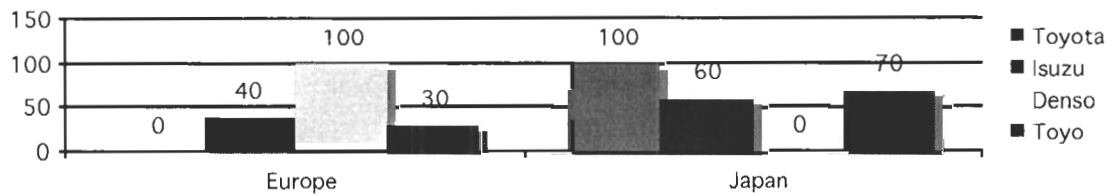
Figure 4.3.1 Local content



Denso was once again the outlier for this element with only 15% in-house or local content.

Suppliers - The analysis of the relationships between the subsidiaries in Poland and their supplier network is complicated by the fact that Poland is an integrated part of the European economic system. Accordingly, in many cases, suppliers are not located in Poland, but nonetheless can be considered local because of their European location. Here suppliers only accounts for materials which has not been manufactured in-house:

Figure 4.3.2 Origin of suppliers



For Denso, all supplies not manufactured in-house come from Polish (15%) and Italian (85%) suppliers. Isuzu is a distant second with less than half of external supplies coming from European-based firms, with Toyo close by at around a third. Toyota has no supplies originating within Europe at the moment as most components are manufactured in-house.

Table 4.3 Procurement

	TOYOTA	ISUZU	DENSO	TOYO SEAL
Local Content	70% of the product is manufactured in-house. The other 30% comes directly from Japan	Between 40 and 60% of content in finished product has local origins (European)	0% (zero) is manufactured in house (therefore pure assembly); 15% from Polish suppliers, while the rest comes from Italian and other European suppliers. Between 40 and 60% of content in finished product has local origins (European)	About 30% is manufactured in house. The rest comes from Japanese and other Asian sister plants (Indonesia). No significant content from within Europe.
Suppliers	All content currently not manufactured in-house comes directly from Japan, or Japanese suppliers in Europe.	Core supplies and parts brought in directly from Japan; however a considerable proportion comes from non-Japanese suppliers within Europe; Polish suppliers very limited	Supplies come from other operations of this company within Poland and Italy, as well as other European suppliers; absolutely 0% from Japan at this time.	Majority of the parts come from plants in Japan and subsidiaries in Asia. Content from Polish suppliers is currently very low, but management is working to increase this.
Procurement Method	Toyota Production System is applied to the furthest extent possible given the following limitations. First, since 70% is manufactured in-house, and current operations are relatively simple, external logistics are limited. Second, since the facility is new, and "inexperienced", no technological assistance can be offered to other Japanese suppliers who themselves may have more experience. There is a definite aim to expand the TPS system once expansions to the facility are complete.	Just-in-time system is employed in philosophy and deliveries from local suppliers are frequent (twice daily). There is an attempt to reduce inventories as much as possible. Technological assistance and long-term contracts with European suppliers are very limited. Reduction of inventories constrained by transportation logistics.	The Japanese contracting system is NOT used. Deliveries from local suppliers are once-per-week at best, and inventories are high. Technical assistance is offered to local suppliers when necessary, but this seems to be at a very low-level.	No evidence of significant deployment of JIT system. Deliveries from suppliers are on a monthly basis, requiring high inventory levels. Trading with local suppliers is limited, but management wants to expand local supplier network.

Procurement Method - The procurement method by which the subsidiaries in question relate to their suppliers is perhaps the most important element in this group because it demonstrates the extent to which the Japanese contracting system, just-in-time, and other important elements of supply logistics have been transferred from the Japanese system.

For Toyota at TMMP, the procurement method reflects their Japanese practice extensively in philosophy, but:

Our current operation is relative simple, because of the [...] one type six model, and volume-wise limited, not so big also, so we are not fully applying our TPS thinking about logistics. But in near future we are producing the engine and transmission and double up the size, perhaps we should fully utilize the TPS thinking (Interview #1).

Since the facility has at the present no relations with local suppliers, the Japanese contracting system is of no consequence locally, and logistics are uncomplicated since only 30% of supplies need to be sourced, and even then, supplied purely by Toyota Motor Corporation itself. Management obviously does hope to expand the role of TPS procurement methods as supply logistics increase in complexity.

For Isuzu, just-in-time procurement philosophy also plays an important role:

We have two main sources of parts, the first is Japan, which entails a different logistic – since we use marine transport. The European inventory comes by way of road transport. These two sources also determine different inventory levels. In terms of Japan, for the sake of safety, because the boat could sink, and we cannot stop production, so we have 10 days of inventory on Japanese parts, and 5 days of European inventory.

Unfortunately, the ship only comes once per week, so we have to have a minimum inventory of one week. But I have to tell you that the delivery system is incredibly punctual, by the clock. This functions according to a “Japanese clock” (Interview #2).

In contrast to the situation at Toyota, the implementation of JIT (just-in-time) practices and procedures at Isuzu is hampered not by the nature of production logistics, but by poor transportation connections between Poland and Japan. With respect to supplier relations, the facility has no Japanese-style contracting relationships with any

European suppliers in the sense of continuous cost reduction, profit sharing, or long-term technological assistance, but JIT is implemented in philosophy.

At Toyo Seal, deliveries of supplies are on a once-per-month basis from sister facilities in the UK and Indonesia – hardly just-in-time, and the proportion of parts coming from Polish suppliers is quite low:

[the proportion of local suppliers is] small, very small, but we hope, we want to increase Polish sources (Interview #3).

Finally, Denso shows no Japanese characteristics in its procurement method, and traditional ties with Italian firms dominate the supply chain. As a result, inventories are quite high with frequency of deliveries in the week-range at best.

Overall, it is evident that several factors have forced the adaptation of procurement methods. First, the nature of transportation links between Poland and Japan limits just-in-time logistics, which are further hampered by a virtually non-existent local supplier network due to the youth of the case study facilities. Additionally, the nature of production activities, particularly the product complexity and the ability to manufacture parts in-house is limiting the need for complex supply logistics at this stage.

4.4 GROUP CONSCIOUSNESS

Group consciousness is often considered the most difficult to implement in foreign environments because of its close ties to Japanese culture and management style. This is indeed verified by the data collected from the four subsidiaries (Table 4.4).

Small group activities - Small group activities depend on a group-oriented cultural predisposition that Japanese companies have found difficult to replicate in their foreign subsidiaries. Most Japanese facilities in the United States manage to implement some group activities, but they are typically limited in scope and scale, and not all workers participate (Abo, 1994; Alston, 1986; Odaka, 2001). The situation is similar in Poland.

At TMMP, group activities are indeed seen as a critical component of the production system; however, their development has been limited to date:

We are developing QC circle activities, its typical small-group activity, and we involve nearly half of our employees. Half of our shop-floor members, so its still growing (Interview #1).

The short-time that this facility has been operating is definitely a factor, as small-group activities, and group consciousness in general take time to develop.

The pattern was similar at Isuzu where small group activities were dedicated and seemingly limited to continuous improvement activities, though not all workers participate:

There are several possibilities, but generally, kaizen is a Japanese term and small teams work on this (Interview #2).

Furthermore, management made clear that while some elements of the Japanese production system are transferable, “cultural factors tied with Japan [such as group consciousness] have been cut out” (Interview #2). Similarly, Toyo Seal had “just started” small group activities, primarily in the form of quality-control circles. Denso was the only facility that had not implemented any kind of small-group activity to date, nor had any plans to do so in the future. The key factors influencing implementation of small group activities seem to have been 1) length of operations, and 2) Polish cultural environment.

Information Sharing - The goal of typical Japanese information sharing practice is the company wide dissemination of information between management, leaders and workers, as well as between production, maintenance, and engineering. The idea is that knowing what is wrong is the first step to knowing how to fix it. Here, the subsidiaries in Poland score fairly poorly for several reasons. At TMMP, information sharing takes place largely through informal channels for the time being:

Its easy to make some communication, or to build up informal communication network covering all 400 or 500 people, [...] so such formal or intentional information sharing system is not existing within this company. However, our number is very rapidly growing, [...] up to 1000 more, so its very difficult to rely on such informal networks of communication, so within this year we provide that sort of formal, intentional information sharing system within this company (Interview #1).

Table 4.4 Group Consciousness

	TOYOTA	ISUZU	DENSO	TOYO SEAL
Small group activities	Small group activities take the form of QC-circles, in which more than half of the production workers currently participate. Management plans to expand these activities.	Small group activities take the form of kaizen-circles; however, their impact on the operations of the facility seems to be limited.	No small-group activities are employed. Workers strictly perform production line tasks with little interaction among each other.	Small group activities include kaizen-circles; however, these activities are currently very limited in scope and scale and less than 50% of workers participate.
Information sharing	Due to the relatively small size of current operations, information sharing is a very informal process. However, with continuing expansion, there are plans to formalize information sharing to cope with a larger number of employees since informal means will become ineffective.	No open-style offices. Management meets with all workers bi-annually. Team leaders and supervisors meet with workers twice-daily	Very small size of workforce means that information is shared informally. No emphasis on special provisions or improvement of information sharing. Workers seem to have little interaction with management or with each other, at least for the purposes of "improvement" activities.	Management meets with all workers when necessary. Team leaders and supervisors meet with workers regularly. Offices are open style, but little coordinated effort to stimulate vigorous activity in this area.
Sense of unity	A sense of unity is promoted to some extent. Although all employees wear uniforms, these are not seen as a necessary component of a healthy group consciousness. Instead, the facility holds social events which are popular with workers and their families. Morning ceremonies are limited by Japanese standards.	A sense of unity is actively promoted through mandatory uniforms, shared lunch areas, etc as company policy. Morning ceremonies are non-existent, and social events are very limited.	Outside of standard company uniforms, no particular effort is made to create a sense of unity among the workers.	Very little is done to promote a sense of unity. No social events are currently organized, though some may come into being shortly. All employees wear uniforms and these are compulsory. Management seems detached from workforce and disappointed with the level of group consciousness.

Apparently a formal Japanese information sharing practice is in the works, but currently the smaller workforce and short time in operations²⁷ means informal channels suffice for the time being. Perhaps formal information sharing systems are not common to Japanese operations with less than 1,000 workers, more or less. At Isuzu, the number of employees has been slightly higher for a while, and a more formal information sharing practice is in evidence:

Each worker has two meetings per day with his or her boss. One is before work and one is at the end of the day. This is mandatory. At these points the line is stopped and they are meeting. Of course both of these meetings have some sort of goal, and occur daily.

Aside from this, we also have meeting with higher management, lets say the president, has mandatory meetings with the entire workforce twice per year. So basically the lower down the hierarchy you go the more frequent the meetings (Interview #2)

Similarly, Toyo Seal has regular meetings both between workers and team leaders, and between management and the entire workforce. There appears to be no formal information sharing outside of these regular meetings; however, with a labour force of only around 50, perhaps informal channels suffice. Management does encourage an “open-door” policy where workers are encouraged to communicate problems and ask questions. Finally, Denso shows the least formal arrangements for information sharing, and indeed little interaction between workers and management, or among workers themselves.

Sense of unity - Sense of unity is a difficult thing to measure without participating extensively in the facility. However, it is certainly possible to ascertain the position of management with respect to the creation of a sense of unity, by looking at the presence of uniforms, logos, shared parking and cafeteria facilities, and various group activities. In general, the four firms showed little evidence of a strong group identity of sense of unity.

At TMMP, there are indeed *some* efforts to create a sense of unity. While workers do wear Toyota-badged uniforms²⁸, and cafeteria facilities are common and open

²⁷ Currently only in operation since 2002

²⁸ Again, Polish health and safety regulations *require* uniforms, but these do not have to carry the corporate logo of the employer (workers cannot wear jeans and T-Shirts)

to anyone, there is no morning song or stretching, and parking is not common. Most interestingly however, the firm does try to involve the workers of the families in events:

There is a summer festival or something. Its like an open-day of the plant. Its associated with the opening day of the plant, and all, not all, but [only the] interested, and the families are invited here to observe the particular conditions of the plants, and after that they all move to some area and to have a party... it's a big event for our employees (Interview #1).

Apparently, the workers accept the corporate identity to a certain extent and are willing to participate in such activities. At Isuzu, workers also wear uniforms, but parking and other facilities are not common to workers and management. The situation is similar at Toyo Seal, where uniforms are once again worn, but there are no particular activities that would contribute to a sense of unity. At present management has been disappointed with absenteeism rates and it appears that there are some cultural divisions between management and labour. Denso Manufacturing has a very long history and the region, therefore it was surprising that a sense of unity was largely non-existent. This is perhaps related to the fact that a significant proportion of workers is composed of temporary hires. Additionally, while Denso uniforms, business cards and logos were visible, there was little other indication that this was indeed a Japanese facility.

4.5 LABOUR RELATIONS

The group of practices and procedures that make up the labour relations elements of a production system are particularly interesting in the case of Poland, where labour unions have played a very powerful and significant role, both for industry and the country's political scene as a whole. Accordingly, one could expect significant conflict between traditional Polish practice and the Japanese ideals; however, actual practice for the case firms was remarkably close to that in Japan (Table 4.5).

Hiring Policy - Hiring policy relates to who the firm hires, and how it conducts the selection process. As mentioned previously, all four of the case study firms are located in traditionally industrial areas, while Japanese firms typically locate foreign subsidiary operations where the workforce is homogeneous (i.e. green-field).

Apparently, there is something different about the Polish context that encourages these firms to locate in industrial areas.

For Toyota, which is located in a very traditional industrial area, with a large unemployed, industrially experienced workforce, hiring policy boils down to the selection process:

In the case of the team member level we are not interested in the experience or the knowledge or something like that. Of course there is some educational status requirement [...] that is the least requirement a candidate should have, but above that we have not so interested in people's knowledge and experience or something like that, but we are much more interested in flexibility, welcome to change, or to accept the new things, or such and such. And to, develop themselves eagerly. If we can see such kind of values within the candidate we pick up them (Interview #1)

Furthermore, the lack of experience was critical in new employees:

We admire or appreciate [...] always changing, the continuous improvement is the key value, so if someone sticks to the old situation, it becomes a sort of struggle for us, so we don't want to such type of people to intake within our organization (Interview #1).

Management was also quick to point out that they are not experiencing problems with a legacy of the old socialist industrial system:

In the case of the younger generation they are very flexible, to learn very much, very keen to learn. We are very happy about that (Interview #1).

The situation is similar at both Isuzu and Toyo Seal, where the preference is to hire completely inexperienced, young workers who are open to new ideas and willing to learn:

We start with the assumption that we would like to teach people good work ethic from scratch. If someone comes from the old system, we have a problem (Interview #2).

Apparently, hiring young inexperienced workers is a strategy common to Toyota, Isuzu, and Toyo in an attempt to circumvent the "old system", or worker mentality from the socialist era in Poland. The situation is different at Denso, where the facility hires primarily experienced, temporary production workers.

Table 4.5 Labour Relations

	TOYOTA	ISUZU	DENSO	TOYO SEAL
Hiring Policy	Applicants mainly selected for youth, flexibility, and willingness to learn a new system, lack of experience with the old "command" system in Poland. Plant site is definitely in a traditional workforce area.	Applicants mainly selected for youth, flexibility, and willingness to learn a new system, and complete lack of work experience under the old "command" system in Poland. Plant is green-field site, but in traditional industrial area.	Plant is located in a very traditionally industrial area. There are no special provisions for screening new hires, as most are temporary workers. Any skilled hires are primarily on the basis of previous experience and technical skill.	Applicants mainly selected for youth, inexperience and desire to work. Selection process seems to be limited compared to other facilities. Plant is a green-field site, but located in a traditionally industrial area (same park as Isuzu)
Job security	Although there is no explicit, written no-layoff policy, there is a strong emphasis on long-term employment. Management sees no need to explicit policy since the facility is currently hiring nearly 50 workers / month	No mass layoffs have yet occurred as the facility has been operating for a short period and is current hiring more workers. The size of the workforce is dictated by "market forces".	Layoffs have occurred even within this small workforce. Most current workers are temporary hires and there is absolutely no emphasis on long-term employment.	There is an emphasis on long-term employment but this may be at odds with hiring-policy in reality. There is no explicit no-layoff policy and there have been some individual layoffs. The facility is currently still hiring new workers so downsizing is unlikely.
Labour unions	There is no union and facility appears to have very good labour relations	There is no union yet however there is currently a drive to unionize within this year.	Some workers belong to two different unions but membership is not obligatory. No strikes have occurred recently, but there is no special management - labour consulting system, and relations seem distant.	There is no union but tensions in labour relations are evident in terms of absenteeism problems, etc. No organization drives are known to be taking place.
Grievance procedures	While there is no union, there are written grievance procedures, which place emphasis on resolution on the shop-floor	There is significant emphasis on resolving grievances through the team leaders and supervisors on the shop-floor. Management is rarely involved.	Any "labour issues" are directed to the union representative. Little intent to resolve issues on the shop-floor - "old" grievance resolution procedures set precedent.	There is an emphasis on resolving grievances through team leaders on the shop-floor; however, management has an open-door policy to any worker.

Since the facility is in many respects integrated and still operates under the “old system”, hiring objectives are quite different. In general, there is a strong emphasis within the three other firms on hiring young workers who are willing to continually learn and self-improve, and for whom working for a Japanese corporation will not entail a clash of cultures.

Job Security - There is a strong tradition of lifetime, or in any case long-term employment in the case of the Japanese production system. There is a wide range in how the case study firms performed in this respect, with a gradient from Toyota, through Isuzu and Toyo to Denso.

At TMMP, the current employment situation is in its infancy. Since the facility is hiring workers on a weekly basis, management states there is no need to speak of job security:

Perhaps this expansion will finish in the year 06 so after that we should really think about how to assure our long-term employment. Philosophically, yes, we are applying the Toyota philosophy of the long-term employment, of course yes (Interview #1).

With respect to a no-layoffs policy, management stated:

Of course in some future, 2 or 3 years later, we are saturating, so we should clearly mention that long-term employment, we appreciate, but maybe we have no-layoff policy... in some future (Interview #1).

At Isuzu, while there is also an emphasis on long-term employment in philosophy, the attitude toward a no-layoff policy is quite different, and while the facility is currently hiring more workers, labour levels are to be dictated by “market forces”. Similarly, at Toyo, management confirmed a philosophy of long-term employment, but a no-layoffs policy does not exist. Finally, Denso has shed a portion of its workforce in the past, and since it currently aims for numerical flexibility through temporary hiring practices, it offers no long-term employment assurances.

Labour Unions - The situation with respect to the unionization of workers is different among the four firms. This element is particularly interesting because of the strong differences between Poland and Japan with respect to labour unions and labour organization.

At Toyota, there is no union, and have there been no drives toward labour organization. Similarly, at Toyo Seal there is no union and management is unaware of any attempt to organize labour. At Isuzu, the situation is different as explained by management:

I have to tell you that starting from next week, yes [there will be unions]. For seven years there were none, but for some reason they want them now. Although this is not caused by some problem, but that is the fashion here. That is the style. Here we are in a traditional mining area, and in Poland, mining and labour unions went hand in hand and had a long history (Interview #2).

Although both facilities are located in a traditional area and have similar hiring policies, there are clear differences with respect to unionization. Denso Manufacturing is the outlier in this situation, with (as expected) a long history of unionization, where permanent workers belong to several trade unions. Only temporary workers are not unionized at this facility.

For this element therefore, the four case firms represent a continuum, from a long history of unionization to no unions and no labour organization. It is difficult to establish a reason for the difference evidenced in the case of Isuzu as compared with Toyota or Toyo Seal, other than general differences in the dynamics of management-labour relations, and the influence of part GM ownership in the case of Isuzu.

Grievance Procedures - The significance of Japanese grievance procedures is taken to be informal, open-style conflict resolution, with little formalized routine and uncommon external arbitration. In general, three out of the four facilities showed reasonable levels of congruence with Japanese practice.

At TMMP, grievance handling practices concerned mostly an informal open approach to conflict resolution, where workers are encouraged to speak directly with any level of management where and when problems do arise. Management highlights that this is “a typical Toyota way” (Interview #1). In addition, there are specific “concern resolution procedures” outlines in the human resources management system documentation that is provided for all employees when they commence employment at the facility. Similarly, Toyo Seal gave precedence to informal conflict resolution channels, and management stressed an “open-door” policy with respect to management-

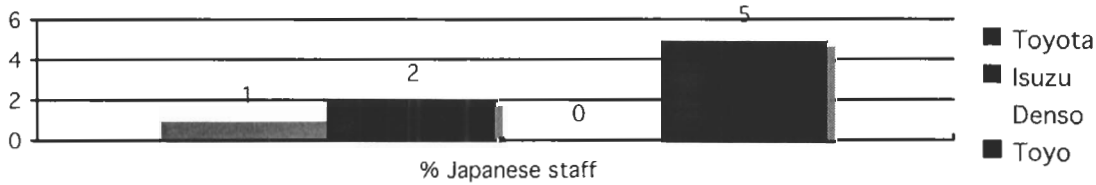
labour relations. At Isuzu, grievance procedures are in a state of flux due to the ensuing unionization process, at which point a much more formalized process for conflict resolution can be expected. At present, the focal point for airing of grievances appears to be the foreman (supervisor) on the shop-floor with whom workers are expected to bring up concerns. There is the unconfirmed feeling that there is a stronger separation between workers and upper management than at Toyota or Toyo Seal. Since permanent workers at Denso Manufacturing are unionized, there are formal grievance procedures and these are handled through a union representative. There is no emphasis on resolving grievance procedures on the shop floor, unlike at Toyota, Toyo, or even Isuzu.

4.6 PARENT-SUBSIDIARY RELATIONS

The parent-subsidary relations group of production system characteristics relates mainly to practices and procedures that determine the power-balance between the parent firm in Japan, and the subsidiary overseas. Important factors herewithin include the ratio of Japanese expatriates at the subsidiary facility, the delegation of decision-making authority to the subsidiary, and the managerial position of locals (Table 4.6).

Ration of Japanese Expatriates - The ratio of Japanese expatriates in a subsidiary facility is to some extent an indicator of the amount of management the parent needs to exercise over overseas operations.

Figure 4.6.1 Percentage Japanese staff



Toyota demonstrated a low percentage of expatriates and a desire to further decrease the presence of Japanese personnel over time. The results were similar at Isuzu, that had a slightly higher ratio of Japanese expatriates, although primarily in support rather than management roles.

Table 4.6 Parent-Subsidiary Relations

	TOYOTA	ISUZU	DENSO	TOYO SEAL
Ration of Japanese expatriates	<p>The ratio of Japanese expatriates is less than 1% and the goal is to reduce this even further over the long term.</p> <p>Management aspires to have the facility operated purely by Polish managers in the future</p>	<p>Ratio of Japanese expatriates is low because facility is in a sense a joint venture between GM and Isuzu, with Polish and American management is dominant.</p>	<p>No Japanese expatriates are based in this facility.</p>	<p>3 Japanese expatriates out of 53 total employees.</p> <p>Management shows a lot of interest in decreasing Japanese presence.</p>
Delegation of authority	<p>Plans are created mostly by headquarters in Europe, supplemented by HQ in Japan.</p> <p>This facility has very limited experience and accordingly only makes decisions regarding minor issues such as building maintenance at this time. Local decision will expand in time.</p>	<p>Plans are created by JMTEL, a planning division of General Motors, NOT Isuzu.</p> <p>The plant has little authority, however, these decisions are nonetheless not made by the Japanese parent, but rather by the US / European HQ.</p>	<p>Subsidiary receives little attention from parent.</p> <p>Most decisions are made locally, except high-level strategic decisions, which seem to fall to the former parent, Magnetti Marelli in Italy, which in turn receives direction from Denso Japan.</p>	<p>HQ in Japan creates all plans and local decision-making is limited mostly to supervisory roles.</p>
Managerial position of Poles	<p>There are two Polish assistant general managers.</p> <p>There are plans to expand their responsibilities and to eventually have a Polish manager, but the latter is some time off.</p>	<p>The president is Polish and most managerial positions are held by Poles or Europeans, although some authority still rests with resident or visiting Japanese expatriates.</p>	<p>All workers and management are Polish at the facility.</p>	<p>There is currently no Polish management, but there is a desire to change this in the future.</p>

Denso did not have a single Japanese worker or manager, while Toyo Seal showed the highest percentage of Japanese staff at over 5%, primarily a function of the small size of the workforce, which artificially inflated the significance of three Japanese personnel.

Delegation of Authority - Delegation of authority concerns the question of whether the Polish subsidiary makes and approves its own strategic and production plans.

For Toyota, the subsidiary was responsible only for very minor issues, while all important decisions rested with headquarters of Toyota in Europe, and also HQ in Japan. Management explained the reason for this as follows:

Basically, [decisions are made in] discussion with Europe headquarters and TMC Japan [...] TMMP has very limited resources, knowledge and experience to manage and consolidate this type of operation. Just, maintenance of this building maybe controlled by us, but to design or to develop something its total difficult issue. We have no resources to think about that (Interview #1).

The situation was similar at Isuzu, where the parent firm(s) makes high-level management and strategic decisions:

The organization responsible for decisions is a separate organization [...] It is a joint operation of Isuzu, or at least the development operation at Isuzu, and General Motors, and this so-called central firm [...] drafts up plans and decides about their realization (Interview #2).

At Toyo Seal, European headquarters in the United Kingdom makes strategic decisions. As at Toyota, the reason seems to be a lack of experience and lack of resources within the local operation. Denso Manufacturing receives direction from the former headquarters at Magnetti Marelli in Italy, in turn controlled by Denso Corp in Japan.

In general, none of the four subsidiaries has any substantial decision-making authority. For Toyo and Toyota, the reason seems to be a lack of resources and experience at the local level rather than issues of corporate control. The latter could be closer to the truth in the case of the operation at Isuzu, although this cannot be substantiated from the information collected.

Managerial Position of Poles - The position of local managers within the company is a good indication of the extent to which the firm wishes to integrate local perspectives.

At Toyota, there is a strong desire to increase the responsibilities of Polish managers:

Currently, we having 2 Polish assistant general managers. One is in office area, one is in production. [...] if they are successful, they will be promoted to general manager in 3 to 4 years. So, I hope, I wish to have a Polish president; however, it takes time (Interview #1).

Isuzu shows are clear division of labour in this area:

Our operations are controlled in such a manner so that the area of production is generally controlled by the Japanese, because we value their abilities in this area – we aren't the only one's who value them in this. But in the areas of administration and finance, either Polish or American managers are active (Interview #2).

While management at Toyo Seal expressed interest in expanding the role of local managers, the development of HR in this area would take time, as currently the only management related position held by a Pole is the single shop-supervisor position, while engineering and higher management positions are the area of Japanese expatriates.

Denso stands in complete contrast once again, where there is no Japanese staff or management, and the facility is managed and operated by Polish personnel. For the three other firms, and especially in the cases of Toyota and Toyo, time seems to be the single most important factor in developing a greater presence for Polish managers. Both of these facilities showed interests in a local operation operated by local people in the future.

4.7 SUMMARY OF ADAPTATIONS

The preceding section provided a comprehensive comparative account of individual characteristics of the production system of the four case firms. Some clear patterns have emerged regarding which elements of the Japanese production system have been adapted, and which remain intact. Possible reasons for these adaptations are

explored as a preamble into a deeper analysis in the subsequent chapter regarding the impact of the Polish environment on these four subsidiary operations.

Elements that were adapted include the following. Information sharing saw a good deal of adaptation, especially within the smaller operations. In the view of management, these facilities did not require formal information sharing systems in the Japanese sense. Apparently the small size of the labour force compared to facilities in Japan allowed informal communication channels to suffice, meaning that senior management was able to speak directly with team leaders and supervisors on a regular basis. That said, the operations that expected workforce expansions had plans for implementing formal information sharing systems in the future. A significant adaptation to Japanese practice stemmed from a clash of cultures with regard to group work meant that small group activities were limited in scope and scale in the case study firms. In terms of procurement, simple logistics meant that the just-in-time system common in Japan was not necessary at present. In some cases, transportation infrastructure, particularly the sparse connections between Poland and Japan hamper the development of JIT. Also, a virtually non-existent local supplier base meant that JIT logistics are slow to develop, though management did show interest in expanding the role for local suppliers. In terms of sources of equipment, the production lines of two of the firms were outfitted by European suppliers, who built the factory to Japanese specifications. This is an interesting adaptation and likely a result of a GM ownership stake and relationship with the Polish division of Opel in the case of Isuzu Poland.

In contrast, elements of the production systems of the case study firms that did not show considerable adaptation fall mainly in the production control groups. For example, with respect to maintenance, firms prefer to decrease the level of automation where maintenance resource are insufficient to operate sophisticated lines, rather than adapt Japanese maintenance practices (for example by contracting out maintenance as European and American firms do). Quality control practice varied highly among the case study firms, but there were clear indications that management was reluctant to stray from Japanese practice in terms of QC. Differences between practices among the case studies seem to reflect more the differences between the Japanese parent firms (heterogeneity of the Japanese enterprises) than any adaptation to Polish circumstances.

CHAPTER 5: INDEXES, TYPOLOGIES & TRAJECTORIES OF HYBRIDIZATION

This chapter carries further the analysis from chapter five by measuring the extent to which the case study production systems have become “hybridized” through adaptation to Polish circumstances. In particular, the extent of hybridization is quantified using Abo’s (1994) index of hybridization. This index compares the actual features of the case study firms to what is known about practice in Japan. Using this framework, it is then possible to develop a typology of hybrid production systems on the basis of the four case study firms. This typology is developed using Abo’s (1994) four-perspective analysis, which examines the extent of hybridization in four key categories of the Japanese management system. Finally, by comparing the various types of hybrid firms identified in the typology against their performance, trajectories of hybridization are constructed using a method adapted from Boyer *et al* (1998). These trajectories illustrate the various paths taken by Japanese transplant facilities in Poland as a consequence of the adaptation to this host environment. The results of these three methods of analysis paint a complex picture of how and to what extent Japanese firms are adapting their production management systems in Poland.

The format of this chapter is organized around the methods of analysis developed by Abo and Boyer *et al* with respect to hybridization. The first part of the chapter provides an overview of Abo’s index of hybridization and four-perspective analysis, as well as Boyer *et al*’s trajectories of hybridization methods. The subsequent sections of the chapter apply these methods to the case study firms.

5.1 METHODS OF ANALYSIS

Three methods are used to analyze the extent of hybridization among the four case study firms. The first method, Abo’s *hybridization index*, measures the extent to which a production system is adapted to practices in the host country. The index of

hybridization is obtained through a five-point evaluation of the 23 elements of the Japanese management system detailed in chapter three. Actual conditions observed in case study firms are compared to documented practices in Japan (as presented in Chapter three). Scores are assigned to each element based on how closely it represents Japanese or conversely indigenous practice. The criteria for how these ordinal scores are assigned is defined in Appendix A. A score of five (5) is awarded to any element that is identical to documented Japanese practice. Conversely, a score of one (1) is awarded to any element that shows no Japanese practice. Therefore, a score of one represents local practice, while 5.0 represents Japanese practice. In between these extremes, scores between two (2) and four (4) are awarded to elements that show a mix of both Polish and Japanese practices, with a score of three (3) representing an even mix of each system. It is noteworthy that the 23 elements used in the calculation of the index are ordered from most to least important in terms of how critical these are to the Japanese firm (Abo, 1994).

Second, an additional method of analysis is the four-perspective analysis developed by Abo. In this analysis, the 23 elements of the JMS are divided into “human”, “material”, “method” and “result” groups. The four groups are composed as follows:

- The human-method group includes: all elements in group I) work organization and administration, group IV) group consciousness, plus elements 18) job security and 20) grievance procedures.
- The human-result group includes: elements 21) ratio of Japanese expatriates and 23) managerial position of Poles.
- The material-method group includes: elements 8) quality control, 9) maintenance, and 13) procurement method,
- While material-result group includes: elements 7) equipment, 11) local content, and 12) suppliers.

The human and material *results* groups refer to cases where production equipment, trained personnel, machinery, tools and other supplies are brought in from Japan in material form. In essence, these groups measure the extent the case study firms have brought in ready-made solutions from Japan. By contrast, the human and material *method* groups refer to elements of the production system that embody the *philosophy* of lean production. Using this approach it is therefore possible to test for whether the firm

seeks to apply Japanese production system philosophy to attain end results similar to their Japanese facilities, or whether it seeks to bring those end results directly to the host country in the form of human and physical capital.

The final method of analysis used in this chapter is the hybridization trajectories analysis developed by Boyer *et al* (1998). In this analysis, a firm's adaptation over time is graphed against measures of performance, such as the defect rate for example, to illustrate the normative aspect of hybridization. The measure of the performance of individual subsidiaries is typically measured against the performance of its parent firm in Japan. Therefore, what is being measured is the difference in performance between the parent and subsidiary. This relative measure of performance allows for comparison of the effects of adaptation on performance across a set of heterogeneous firms. On the other axis of the graph, adaptation is measured in terms of time, but also in terms of the stages of adaptation²⁹. The trajectories of hybridization provide a useful method forming generalization about the effect of adaptation on firm performance.

The strengths and caveats of these three methods of analysis need to be understood. First, regarding the index of hybridization, assigning ordinal values for particular practices is inherently a judgemental process. In this respect, an effort has been made to ensure that the criteria with which numeric values were assigned to actual practices has been specifically adapted since this is the first time such analysis is employed for firms in Poland. Appendix B details the modifications that were made to Abo's original criteria in light of circumstances in Poland. Furthermore, the index of hybridization is an ordinal scale measurement and therefore while we can order the firms by their extent of hybridization we cannot know the distance between their practices. That is, a firm with a production control score of 2 does not necessarily show double the adaptation of a firm with a score of 3 – all that can be known is that it shows *more* adaptation. Accordingly, no judgements are made regarding the degree to which firms vary with respect to any particular practices. Second, the four-perspective analysis method inherits all caveats from the index method, since it is based on the same numbers. In addition, the division of practices into groups defined as human, material, method, and

²⁹ The two stage of adaptation are discussed in chapter two of this thesis

result may prevent the interpreter from recognizing the complex interactions between these groups. That is, adaptation of material result practices by purchasing production equipment from local instead of Japanese suppliers may entail a similar shift to local versus Japanese maintenance personnel. Accordingly, the possibility of such-interactions need to be recognized when interpreting the results of the four-perspective analysis. The original methods developed by Abo (1994) present some additional interpretative challenges. First, they are based on the assumption that adaptation has a mostly negative impact on the performance of firms. Adaptation is thought to merely facilitate the application of other Japanese elements, improve performance through cost-cutting, and stimulate a positive reception of Japanese practices locally (Abo, 1994). However, the theoretical framework developed in chapter two of this thesis suggest that the result of adaptation is not necessarily negative. This conflict is in part offset through the application of the hybridization trajectories analysis, which offers insight into the relationship between performance and hybridization. Finally, in relation to the trajectories of hybridization, the most significant difficulty is the lack of reliable and comparable data on the “performance” of firms. Without a standardized measure of performance, the delineation of trajectories is merely suggestive. Therefore, for this study, an effort was made to ask management about their *satisfaction* with levels of performance vis-à-vis their parent firm, and inferences have been made on this basis. Finally, in light of the aforementioned caveats, no complex quantitative analysis should be attempted on the basis of any of these three methods of analysis. Accordingly, when and where calculations such as taking the averages of values are taken, the original numbers are provided wherever possible to retain transparency in the analysis.

5.2 INDEX OF HYBRIDIZATION

The production systems of the four case study firms presented in great detail in chapter five vary from documented Japanese practice. In fact, management was clear in highlighting some of the most important adaptations made to their production systems in response to operating under Polish circumstances. Having confirmed that the case study firms show a mix of Japanese and Polish practice, it is useful to measure the extent of this hybridization. Table 5.1 shows the hybridization index for each element of the production

systems of the four case study firms. The closer the index number is to 5.0, the closer the firm's production system is to the production system of its parent firm in Japan.

Table 5.1 Hybridization index for case study firms

Characteristic Element / Firm:	ISPOL	DENSO	TMMP	TOYO
Work Org. and Administration	4.2	2.2	4.6	4.0
-Job Classification	5.0	2.0	5.0	5.0
-Wage System	5.0	3.0	3.0	5.0
-Job Rotation	3.0	2.0	5.0	1.0
-Education and Training	4.0	2.0	5.0	4.0
-Promotion	4.0	2.0	5.0	5.0
Production Control	2.5	1.3	5.0	4.3
-Equipment	1.0	1.0	5.0	5.0
-Quality Control	2.0	1.0	5.0	3.0
-Maintenance	3.0	1.0	5.0	5.0
-Operations Management	4.0	2.0	5.0	4.0
Procurement	2.7	1.7	3.3	3.0
-Local Content	3.0	1.0	2.0	4.0
-Suppliers	2.0	2.0	4.0	4.0
-Procurement Method	3.0	2.0	4.0	1.0
Group Consciousness	3.0	1.0	3.0	2.3
-Small group activities	3.0	1.0	4.0	2.0
-Information sharing	3.0	1.0	1.0	3.0
-Sense of Unity	3.0	1.0	4.0	2.0
Labour Relations	3.3	1.3	4.0	3.8
-Hiring Policy	3.0	1.0	3.0	2.0
-Job Security	3.0	1.0	4.0	4.0
-Labour Unions	3.0	2.0	5.0	4.0
-Grievance Procedures	4.0	1.0	4.0	5.0
Parent- Subsidiary relations	2.3	1.0	3.3	5.0
-Ratio of Japanese Expatriates	2.0	1.0	1.0	5.0
-Delegation of Authority	3.0	1.0	5.0	5.0
-Managerial positions of Poles	2.0	1.0	4.0	5.0

Categories drawn from (Abo, 1994); author's fieldwork

An index of 5.0 indicates zero adaptation to Polish circumstances. Conversely, an index of 1.0 indicates an absence of Japanese practice, or a complete adaptation to Polish circumstances.

Following on the format of the previous chapter, an index of hybridization is calculated for six groups of practices common to the Japanese management system. Some interesting patterns are evident. First, the extent of adaptation clearly varies among the four firms, and each is a different hybrid. Starting with the work organization and administration group, it is evident that Toyota, Isuzu, and Toyo all score above 4, indicating that these firms have transferred job classification, rotation, education, training and promotion as well as wage systems from Japan with little significant adaptation to Polish circumstances. Conversely, Denso, with a score of 2.2 bears little resemblance to Japanese firms and in fact closely emulates Polish industrial practice instead. The index for the production control group of practices is much more diverse. Here, Toyota leads the case firms with perfect score of 5 out of 5, indicating

Its equipment, quality control, maintenance and operations management practices are completely inline with what is done in Japan and show absolutely no modification to Polish circumstances. Toyo Seal also shows very little adaptation, with strongly Japanese operations control practices. Isuzu on the other hand, demonstrates a near even mix of Japanese and Polish production control practices – true “hybrid”, while once again Denso comes in at the bottom with a score of 1.3 and exceedingly little evidence of Japanese practice. Procurement shows perhaps the greatest average extent of adaptation to Polish circumstances, with Toyota, Isuzu, and Toyo all showing a near even mix of Japanese and Polish practices with scores hovering near 3. Continuing on, group consciousness practices showed considerable adaptation across the four firms. In particular, information sharing fell well short of what is typical in Japan and small group activities only extended to some parts of the organizations. Labour relations included many elements of Japanese practice in all firms except Denso, which was dominated by more traditional Polish labour relation practices with an index of only 1.3. Once again, Toyota showed the greatest extent of Japanese-style labour relations with a score of 4.0. Finally, parent subsidiary relations present a somewhat different picture with Toyo Seal leading with a perfect score of 5.0, indicating thoroughly Japanese practices with no adaptation. The

other three firms show a departure from Toyo, especially with respect to the role of Polish managers, a category that shows strong adaptation even in the case of Toyota and Isuzu with indexes of 1.0 and 2.0 respectively. In general, Toyota shows the least adaptation, while Denso shows the most; though there are exceptions in procurement and parent-subsidiary relations in particular. Isuzu consistently shows the most even mix of practices and therefore represents a most complete hybridization.

Figure 5.2.1 shows the measurements of hybridization from Table 5.1 in graph form. Using this graph, it is possible to visualize the extent of hybridization for each case study firm. The graph is an easy visual guide to the extent of adaptation, or departure, from Japanese practice. The outer edge of the graph reflects the Japanese ideal. The inner point on the graph represents practices and procedures that have little or nothing in common with Japanese practice. The data from Table 5.1 has been graphed for each of the four case study firms. Several conclusions can be drawn from this representation of data. First, Denso and Toyota clearly inhabit opposite end of the spectrum with respect to the extent of hybridization. Second, most firms show differences across the groups in terms of the extent to which they have been adapted. Work organization and production control consistently mimic Japanese practice, while other elements have been adapted more frequently. This may bear relation on the relative importance of certain practices to the functioning of the Japanese management system.

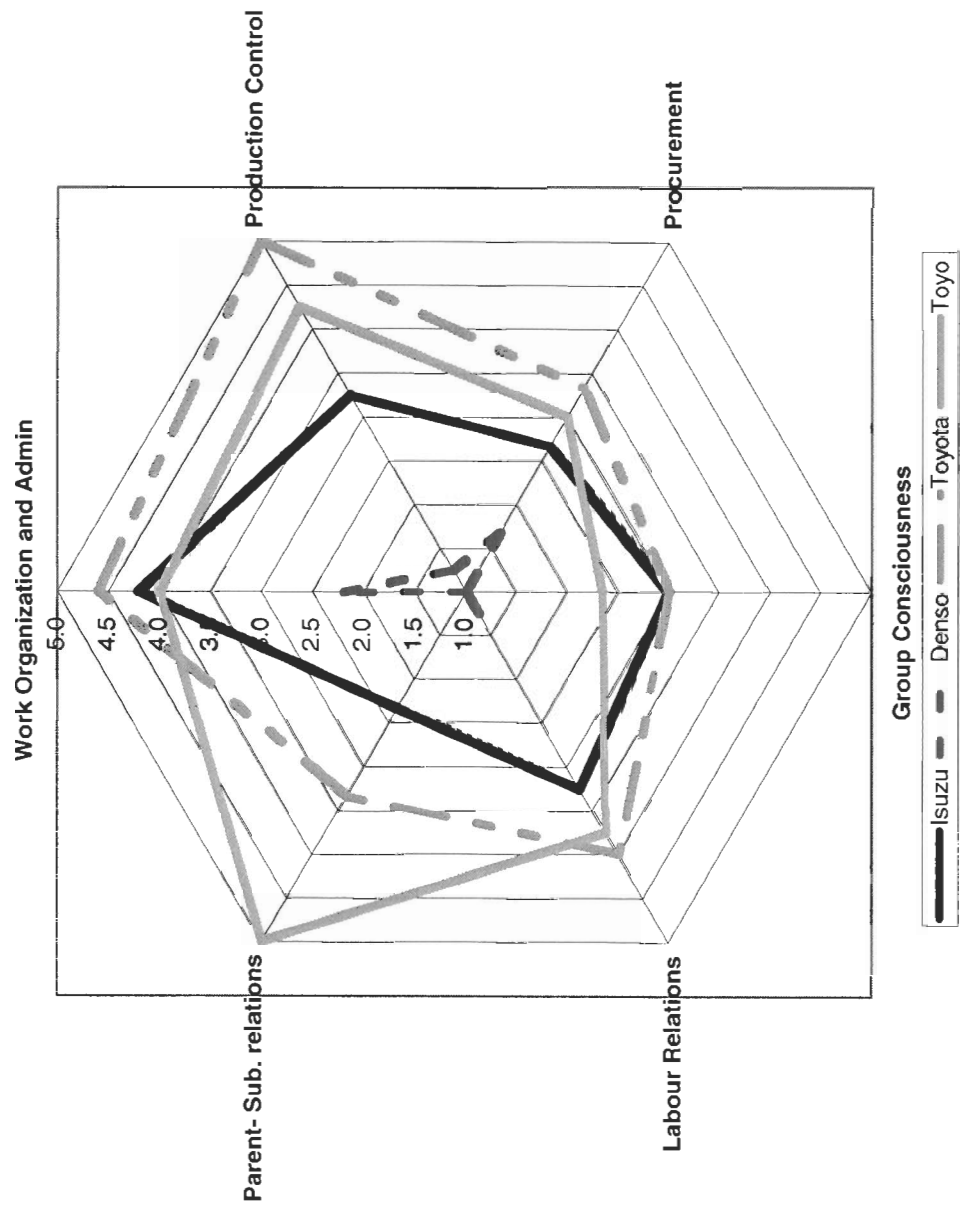


Figure 5.2.1 Hybridization index as divergence from donor and host

5.3 TYPOLOGY OF HYBRID SYSTEMS

The purpose of this section is to explore a typology of hybrid production systems given the four case-study firms. First, the hybridization indexes from the previous section are arranged into four groups corresponding to human methods, material methods, human results, and material results. An average of the indexes is taken for each group in order to determine which demonstrate the greatest adaptation. This measure is then used to categorize firms within the study. A ranking of these categories, or types of hybrids is developed on the basis of how well firms managed to maintain Japanese practices seen as critical to the integrity of the Japanese management system. Finally, this ranking is combined with information gathered on performance to construct possible trajectories of hybridization for the four firms in question. Of primary consequence is the ability to draw generalizations about the behaviour of Japanese subsidiaries from the results of these analyses.

5.3.1 Four-Perspective Analysis

The tables below contain measures of hybridization derived with the four-perspective approach. They also show the category under which the firm in question is suspected to fall given the observations in the preceding chapter.

Isuzu shows relatively strong application (3.55) in the human-method group, a much weaker (2.67) application rating in the material-method group, and low (2.0) ratings in both results groups. These scores are in indication that the firm has focused largely on applying the Japanese production system philosophy with respect to work organization and administration, and grievance procedures (4.2), while compromising on group consciousness and job security (3.0, 3.0). Indeed, the firm seems to have attempted to replicate the Japanese production system philosophy in the work organization and administration grouping with a near total absence of Japanese personnel and management. This case illustrates an overall lack of results application, especially concerning Japanese personnel, equipment, and suppliers, and seems to be an example of

Table 5.2 Isuzu Poland

	Method		Result	
Human	4.2	3.55	2.0	2.0
	3.0		2.0	
	3.0		-	
	4.0		-	
Material	2.0	2.67	1.0	2.0
	3.0		3.0	
	3.0		2.0	
Plant type	American-lead application			

Table 5.3 Denso Manufacturing

	Method		Result	
Human	2.2	3.05	2.0	2.0
	3.0		2.0	
	3.0		-	
	4.0		-	
Material	2.0	2.67	1.0	1.33
	3.0		1.0	
	3.0		2.0	
Plant type	Across the board adaptation			

Table 5.4 Toyota Motor Manufacturing Poland

	Method		Result	
Human	4.6	3.90	1.0	2.50
	3.0		4.0	
	4.0		-	
	4.0		-	
Material	5.0	4.67	5.0	3.67
	5.0		2.0	
	4.0		4.0	
Plant type	Revised application			

Table 5.5 Toyo Seal Poland

	Method		Result	
Human	4.0	3.83	5.0	5.00
	2.3		5.0	
	4.0		-	
	5.0		-	
Material	3.0	3.00	5.0	4.33
	5.0		4.0	
	1.0		4.0	
Plant type	Ready-made application			

Categories drawn from (Abo, 1994)

“American-lead application” whereby local actors, under the auspices of the parent (American-owned) TNC seek to apply the Japanese production system philosophy. Here Isuzu is in clear contrast to Toyo Seal in this sense.

Denso Manufacturing shows low application scores in all groups, with particularly low scores in the two results groups (2.0, 1.3) (Table 5.1). The highest score achieved (4.0) was for grievance procedures, which closely resembled the Japanese system, perhaps only by coincidence, and helped bring the overall human-method group score to a 3.05. This score at best represents a mixing of some Japanese elements of work organization and administration with local elements. The overall low application scores for this case can be attributed to the fact that while this plant is owned by a Japanese firm, it is a brown-field facility with a long Polish history that has received nothing more than financial input from the Japanese parent to date. Oddly, not even the subcontracting relationships have changed much with this acquisition, as is reflected in the very low equipment (1.0), content (1.0), and suppliers (2.0) scores. In summary, this case could be classified as all-around adaptation, or perhaps capital-ownership, non-application type facility. This perhaps varies somewhat from Abo’s EB type firm, in that this case represents not so much adaptation as an absence of application with the introduction of Japanese capital, but not management at the facility.

Toyota’s TMMP shows the highest method application scores of the four cases. Particularly interesting is the high (4.67) score for *material-method* and the equally high (3.90) for *human-method*. The emphasis at this facility is clearly on the application of Japanese production philosophy. This is evidenced with the quality control and maintenance elements which both receive a score of 5.0 – perfect application. Scores varied widely within the *results* groups, with some elements scoring highly, while others reflecting greater adaptation, bringing the average down for both material, and human-results. These scores show that management has been selective in applying certain ready-made elements in the local context, while emphasizing overall philosophy rather than results. By admission of management, the goal was to “learn” the pattern of what works successfully in the local context. Accordingly, this facility could be classified as a revised-application type.

In contrast to the other cases, Toyo Seal shows near perfect *results*-application scores. The perfect *human-result* application score (5.00), and a score of 4.33 in *material-result* underlines that ready-made solutions are brought from Japan and into this facility. By contrast, the application of methods is only average (3.83, 3.00) and represents a somewhat undisciplined effort to introduce the Japanese production system philosophy in isolated cases. In this case, management has expressed frustration with the relative lack of success in introducing these elements and seems intent on replicating the production system as it operates in its Japanese and overseas subsidiary facilities through *results* transfer. This case represents the best evidence of complete ready-made application with little concentrated effort to introduce Japanese production philosophy.

5.3.2 Ranking of Hybrid Systems

According to the table in chapter three, the 23 elements of the production system are arranged according to the degree of impact they have on the efficient operations of Japanese facilities³⁰. According to this assumption then, the human-method group in the 4-perspective evaluation framework is most significant, since it contains elements from the very top of the list. Similarly, material-method and material-result share 2nd place, followed by the human-result group, which proves least significant. According to this ranking, Toyota's TMMP facility shows the highest application in the most important group of production system elements (human-method). This case also shows the highest combined score for the next most significant groups (material-method + material-result = 8.34). The conclusion can be drawn, that this hybrid represents the *best* application of the Japanese production. By contrast, the hybrid production system at Denso Manufacturing shows the lowest application score in the most significant groups, and therefore represents the weakest application of the Japanese production system (practically none at all). Interestingly, while Toyo Seal shows the highest overall application score (4.04) in this analysis when the average of the four groups is taken, it is considerably weaker with respect to the two most important groups of elements (human method and material result) and therefore represents what could be a mis-application of the Japanese production system; perhaps a failed hybrid

³⁰ On the basis of existing research (Abo, 1994: 56).

The results of the 4-perspective analysis are also useful for introducing a normative component into this analysis of production system hybridization. Because the analysis separates measures of method and result hybridization respectively, it is capable of determining whether the hybrid production system is one that is locally-derived in the sense that Japanese methods are employed by local actors, or one that is locally-imposed in a sense that Japanese personnel and equipment are applied, ready-made into the local context. The hypothesis is that the locally-derived model is superior or at least more beneficial to local actors since their stake in the process is increased through this form of “method” application. As the case Toyo Seal illustrates, attempts at applying *results* with no concentrated focus on *methods* application can lead to frustrated local management conditions. This type of ready-made hybrid may face greater long-term challenges in attempting to impose existing Japanese solutions on local conditions, but this remains to be seen. The degree to which the results groups are applied can also be a good indication of the difficulties in applying Japanese methods themselves in a foreign context³¹. This can be due to a lack of local capacity in certain areas such as quality control methods for example. The case of TMMP highlights this situation, where management supplants a push for Japanese methods with select ready-made results that fill local competence gaps, at least in the short term. The example here is of a reduction in the level of automation (result) in order to preserve the firm’s maintenance practices and procedures (methods). As these examples illustrate, the type of hybrid that results from a particular application-adaptation mix can have significant impact on plant operations over the long term.

5.4 TRAJECTORIES OF HYBRIDIZATION

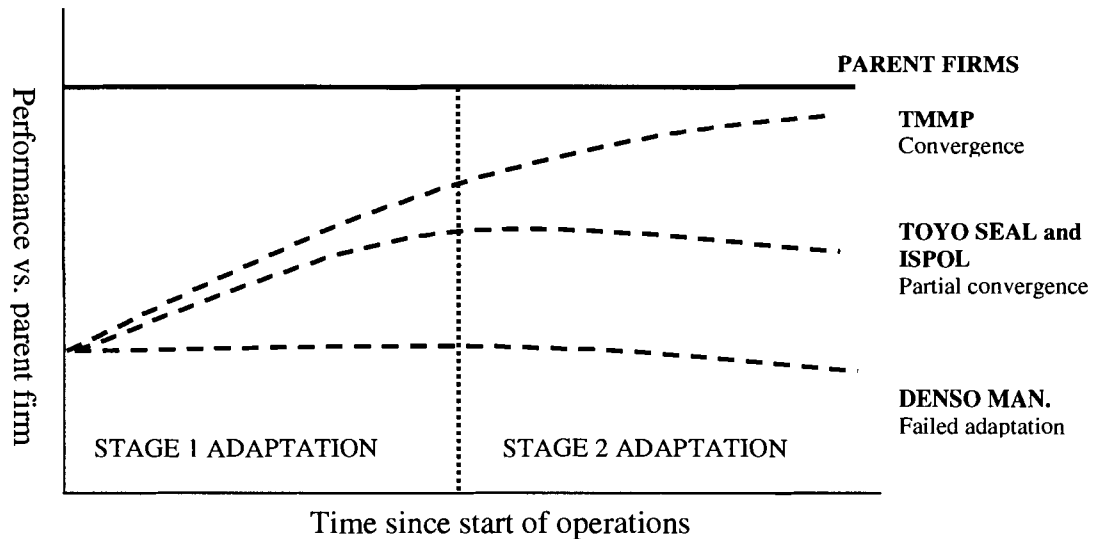
A key underlying concern in this research is whether the quality of products produced in overseas subsidiaries, as well as the efficiency of the operations, are inferior to those of the parent facilities in the home country. There is a common assumption by consumers and industry analysts alike, that products produced in subsidiaries abroad are inferior to products produced in a the home country. Existing empirical research on hybridization suggests that adaptation to local circumstances in general has negative impacts on the performance of subsidiary operations (Abo, 1994). From this point of

³¹ See discussion of this in Abo (1994)

view, although adaptation may be necessary for a firm to function, modifications to the Japanese production management system compromise its performance. For example, Volkswagen's image declined substantially as it started manufacturing vehicles in Mexican factories. This decline was in part due to the loss of "German" image, but also due to concerns, often valid concerns, about the quality of German vehicles that are now in fact of Mexican rather than German origin. The resulting conclusion is that Volkswagen's production system in Mexico compares unfavourably to its production systems in Germany. But, while quality may indeed suffer for various reasons in such circumstances, it is one of the objectives of this research to show that there is no necessary correlation between the hybridization and declining product quality. In contrast to this position, one of the important findings in this thesis is that management attempts to "learn" from local context to improve the performance of the firm. Evidence from the four case study firms suggest that adaptation occurs in two main stages. While the first stage focuses on adapting the Japanese management system to local circumstances, the second stage involves resolving internal contradictions created by the first stage.

Performance of the four case study facilities was crudely measured by asking management to compare the performance of their facility vis-à-vis the parent firm. Management was asked about performance in terms of rates of defect, worker productivity but not profitability, since all four facilities are in their infancy. Three performance scenarios came to light. The first was the case where the facility performed at or near the level of the parent. In the second case the branch-plant was "close" to the parent facility for some indicators of performance, but management clearly indicated that there was room for improvement. In the final scenario, the branch-plant showed no convergence with the performance of the parent in Japan, and there were no concrete strategies for bringing the level of performance on par with the parent.

Figure 5.4.1 Four trajectories of hybridization



The case of TMMP stands out as an example of the stages of hybridization. Initially, the facility's production system is constrained by characteristics of location-specific inputs in the Polish environment. This restriction or barrier takes the form of a shortage of labour knowledgeable in the maintenance of Japanese automation machinery. Accordingly, the facility undertakes its first adaptation, and chooses to reduce the level of automation in order to maintain the integrity of its maintenance procedures. If the Japanese level of automation was maintained, the facility would have to seek third-party maintenance services; a move that goes against the philosophy of the Toyota Production System. Accordingly, the facility operates with higher numbers of labour and more manual production, at a greater cost. However, these changes mean that the informal information sharing practices at the facility can no longer cope with the growing numbers of workers. Prudently, management plans to introduce more formal procedures in order to facilitate information sharing within a larger workforce. This can be regarded as stage II adaptation, or adaptation ensuing from another earlier adaptation. As time progresses, it is likely that the production system will continue to evolve. Here another example is relevant.

At the present time, the facility demonstrates poorly developed just-in-time procurement methods that are really not on par with practice in Japan. The reason for

this adaptation is the relatively simple supply logistics with production is limited to a single product with several models. However, a planned expansion of the facility into several other product lines of increased complexity will mean a more extensive supply chain, and consequently more complicated supply logistics. Management has explicitly stated that as production control elements grow in complexity, procurement methods will be adapted to suit. That is, once again, a first stage of adaptation will be followed by a second to ensure compatibility between elements of the production system. Other such examples are evident, and as management stated it will simply take time to “learn the pattern” of what hybrid system works best at this facility. Even with the considerable adaptations made to the Toyota Production System at TMMP, the firm managed to meet the performance characteristics of sister facilities in Japan, in defect rates and other important performance indicators. The key has been successful stage II adaptation.

By contrast, at Isuzu, management likely envisions the production system with a strict additivity of components in the belief that one element of a production system can be tuned, improved, and modified without any impacts on the remaining elements. Recalling the discussion in chapter two, this “diffusion” perspective stands in stark contrast to the “hybridization” perspective espoused in this study. In the case of Isuzu, certain groups of elements, especially in production control, have been applied in full Japanese fashion, while others, including work organization, group consciousness and equipment elements, have been adapted, not only to the Polish environment, but to the parent conglomerate’s corporate ownership structures³². Compatibility issues between the elements adapted in the first stage and other un-adapted elements will arise that will hamper plant operations. For example, an unwillingness to apply Japanese group consciousness practices will undoubtedly unfavourably impact small group activities, including continuous improvement and quality control circles. Not much is being done to reconcile possible incompatibilities between the various modified elements of the production system. The key to a successful hybrid is the reconciliation of incompatibilities between the Japanese and adapted elements of the production system.

³² Isuzu is wholly owned by General Motors Corp.

The most significant issue at Isuzu is unsuccessful stage two adaptation. This may indeed be the source of performance loss attributed to all adaptation in existing research³³. Information collected from the four case study firms would indeed suggest that stage I *and* II adaptation are requirements for the satisfactory performance of the production system. Accordingly, it is important to study hybrid production systems over a course of time in order to measure the continuing changes associated with the learning process. In this respect, TMMP stands out as a key example of learning through hybridization. While the facility demonstrates significant adaptation to local circumstances in certain key areas of its production system, most notably in the procurement and group consciousness groupings of elements, there is an explicit recognition by management of a need to continuously modify the practices to “learn the pattern” (Interview #1) that produces the best results. This stands in stark contrast to management’s static view at ISPOL, where the entire production system is viewed as static state rather than a dynamic system.

In summary, this chapter has demonstrated that the production systems of transplant Japanese manufacturing facilities in Poland differ to a considerable extent from their parent operations in Japan. These differences have been described in detail and crudely quantified to enable a systematic comparison of case study firms. It has also been shown how the extent of hybridization varies by firm. A typology of hybrid production systems was constructed and conclusions were drawn about which hybrids shows the most potential, both for the firm as well as for Polish industry. According to these findings the system at Toyota Motor Manufacturing Poland is likely the “best” hybrid because of the application of Japanese production system *methods*. By contrast, Toyo Seal stands out as an example where although local practices mimic the Japanese parent, this is achieved mostly through the application of Japanese equipment, suppliers, personnel, and *materials* rather than the enactment of Japanese production philosophies. This latter approach renders the firm less responsive to changing local conditions and reduces the capacity of the firm to assimilate local knowledge through learning mechanisms. Therefore, while hybridization of the Japanese management system is

³³ See especially (Abo, 1994), where adaptation is inexplicably related to performance deficiencies

clearly occurring, the different management strategies of the individual firms play a disproportionate role in determining the nature and extent of this hybridization.

CHAPTER 6: CONCLUSIONS

Japanese firms have experienced great success in manufacturing in the past decades. The resulting expansions of exports, and later, direct foreign investment have created interest in the competitive advantage of the Japanese firm. A key component of this advantage is the system of lean production employed by Japanese manufacturers. In a groundbreaking book, Womack introduced the business world to the secrets of lean production. Lean production has since expanded as a concept and mutated into various forms spreading under various names including six sigma, kaizen and continuous improvement and has been adopted by companies worldwide. A critical assumption underlying this diffusion has been that lean production could be transferred to manufacturers in other countries. In contrast to this position, some have argued that lean production is embedded in the Japanese institutional context. From this perspective, the transfer of lean production to other countries, while still possible, is less straightforward than envisioned by Womack. In fact, the nature of lean production is arguably quite different in Japanese factories abroad than it is in Japan. These differences are created as Japanese manufacturers adapt to the local institutions of the host country in which they are investing. This process of adaptation has become known as production system hybridization, as subsidiaries become hybrids of Japanese and local practice.

This conclusion unfolds in two sections. The first section explores the main points and findings covered in the five chapters. The second section addresses the original research questions and suggests areas for further research, specifically with respect to the role of economic geography in exploring the topic of production system hybridization.

6.1 SUMMARY OF FINDINGS

The main goal of this thesis has been to characterize the production management systems of Japanese subsidiaries in the Polish auto manufacturing industry. Accordingly,

the thesis started with an introduction to lean production as a source of the competitive strength of the Japanese firm. The literature on lean production and hybridization was reviewed and revealed two significant findings. First, while international business and engineering management address hybridization explicitly, this literature lacks a theoretical framework to understand this concept. Second, while economic geographers have explored the behaviour of the Japanese firm abroad for quite some time and from many angles, issues of production system hybridization have not been explicitly addressed within the discipline.

To remedy these shortcomings, this thesis has framed the hybridization of Japanese production systems within recent advances in the evolutionary theory of the firm. From this perspective, lean production is cast as a *competence* of the Japanese manufacturing firm. This competence is to a large extent tied to the institutions and cultural patterns in Japan. However, as the firm establishes factories overseas, it attempts to transfer its competencies to exploit its competitive advantage. Now faced with foreign institutions and culture, the firm usually adapts its competencies to cope with this foreign context. This is particularly the case in Poland, where Japanese firms have relatively little accumulated experience.

The differences between Japanese and Polish institutions and culture are significant on many levels. The state of industry in Poland is dominated by the legacy of socialist central planning, the impact of the transition to capitalism, and the integration of the national economy within the fold of the European Union. For the Japanese firm entering Poland, these factors present opportunities as well as barriers that must be overcome. Because of this, the Japanese firm changes the way it executes certain tasks, rearranges its skills and assets in a manner that adapts the core of its competencies. There are three layers of the Japanese firm's production management system that are subject to such adaptation. The first is the shop-floor production system, encompassing the core of what is formally defined as lean production. The second is the factory management system encompassing broader elements such as human resource *practices*, industrial and supplier relations, organizational culture, and communication and learning processes. The third is the corporate layer, composed of elements that include corporate level R&D, corporate strategy, human resource *policies* and the relation of the firm to the

market, and its supply chain. All of these elements are to some extent reliant on Japanese institutions and culture, and therefore face possible adaptation in the alien Polish environment. As a result, the Japanese factories cropping up across Poland are in fact hybrids of Japanese and Polish practice. This hybridization is important considering the rising level of direct-foreign investment (DFI) in the Polish economy. The particular interaction between the Japanese manufacturing firm and the Polish commercial environment has resulted in very specific hybrid production systems. Studying these systems can reveal much about the behaviour of Japanese manufacturers in the context of Central and Eastern Europe – an increasingly important region that has largely been unexplored in relation to the Japanese enterprise. This part of Europe is increasingly attracting the best and biggest firms across industries and has, along with China, become the leading destination for foreign capital in all types of industries (Bosse *et al.*, 2004).

In order to explore the hybridization of Japanese production management systems in Poland, four Japanese subsidiaries in the Polish auto-manufacturing industry have been interviewed. The interviews and site visits focused on revealing production management practices in six main areas including work organization and administration, production control, procurement, labour relations, group consciousness, and parent-subsidiary relations. These findings were compared to documented Japanese practice and management was asked to account for the differences between practice in Poland, and practice in Japan. The evidence collected strongly suggests that the production systems of the four case study firms show a mixture of Japanese and Polish practice. A particular pattern of hybridization emerged. First, work organization and administration reflected closely practices in Japan. In particular, the Japanese firms were able to implement simple job classification systems, wage and promotion systems focused on performance evaluation and length of service, extensive job rotation systems, and on-the-job training with relative ease. By contrast, parent-subsidiary relations and group consciousness philosophy strayed further from the Japanese ideal. Specifically, information-sharing practices were far less extensive than in Japanese sister facilities, and group activities failed to involve significant numbers of workers. Additionally, the Japanese factories were given greater-than-expected autonomy vis-à-vis headquarters in Japan and they also gave significant decision making authority to Polish management staff. When measured

against very rudimentary measures of performance and management opinions, an interesting picture arose with respect to hybrid systems. Of the four, the facility of Toyota exhibited the highest performance and was able to emulate the results of Japanese sister plants most closely. It appears that the key to this success has been the successful application of the firm's production system philosophy, while adapting the more technical elements where this was required. Conversely, Denso showed by far the lowest performance and little evidence of any Japanese practice. Similarly, Toyo Seal showed lower than expected levels of performance in terms of relative product quality, but a very high level of Japanese practice with respect to matters of hard technology at the level of the shop-floor. Seemingly, the application of the production policies and philosophy is more important than the application of its technical and material elements. For example, it is more important to retain the responsibility for maintenance activity in the hands of production-line workers than to maintain a certain level of automation in a factory. All in all, the four branch plants represent very different and unique hybrid systems, partly due to the fact that they all have different parent firms. Nonetheless, the case studies demonstrated unequivocally that Japanese "lean production" is adapted when transferred abroad in the form of DFI.

The reasons behind this certain adaptation can be explored in a suggestive manner. First, as proposed in chapter two, the costs of transferring certain competencies to a foreign country are prohibitive and this may stimulate the adoption of local practices. For example, the costs of transporting and installing and maintaining Japanese machinery and equipment on the assembly line at Isuzu was apparently so high that management chose a German supplier. Similarly, faced with a lack of personnel skilled in the maintenance of Japanese machinery and the immense expense of recruiting experience personnel from Japan, Toyota decided to decrease the level of automation within their facility. Second, and perhaps more importantly, adaptation occurs due to the barriers presented by the Polish institutional and cultural environment. For example, the tradition of a "13th month" pay bonus in Poland has caused some of the firms to abandon their Japanese performance evaluation-based wage system in favour of a system that Polish workers are used to and often demand. Similarly, the negatively viewed legacy of state socialism and accompanying ingrained attitudes within the experienced Polish workforce

has caused Japanese firms to seek young, completely inexperienced workers. Other examples are more tangible and include limitations on the Japanese just-in-time system because deliveries are constrained by infrequent container connections between Poland and Japan. These are all concrete examples of the barriers associated with operating in Poland and the adaptations that were enacted by the case study firms as a response to these barriers.

6.2 FURTHER RESEARCH QUESTIONS

This thesis has elaborated on a theoretical framework for hybridization by placing the Japanese management system in the context of direct-foreign investment and an evolutionary theory of the firm. Furthermore, it has been empirically demonstrated that hybridization of the production systems of Japanese subsidiaries in Poland is indeed occurring. Specifically, the characteristics of the production management systems of four case study firms have been detailed and compared to documented practice in Japan. Pursuant to this comparison, the extent of hybridization was measured and a typology of hybrid systems was explored. Extensive evidence was presented showing how the unique institutions and culture in Poland were definitive to the adaptation of the Japanese management system. Finally, the relationship between hybridization and the performance was explored, drawing generalization regarding the different types of adaptation strategies employed by the case study firms. In summary, while the original research objectives were met, further questions remain and have indeed arisen since.

A fundamental question concerns whether this type of research is to be carried out within the discipline of geography. Certainly, economic geography has much to offer to studies of international production due to its extensive understanding of economic processes as grounded in regions. However, surprisingly little research has been done in the discipline with respect to corporate strategy and particularly to issues of management. This has been the case even where these have important geographic dimensions. As could be expected, the majority of the research into production system hybridization, and the evolution of the competencies of the firm more generally, has taken place within the international business and engineering management literatures. Perhaps ironically, economic geography as a discipline is largely ignorant of these tangible issues within the

firm, while it claims to be grounded where other disciplines such as economics remain abstract. Accordingly, if geography is to make headway through a grounded approach, perhaps geographers should descend to study what actually happens “behind the factory gates” to address the issues of management transfer, for they clearly entail geographic dimensions. There is much interdisciplinary research to be done in this field, and the existing literature would greatly benefit from a geographic perspective. With this in mind, perhaps I can suggest some topics of particular importance that should place highly in geography’s research agenda.

The first of these relates to the *massive* implications of hybridization to a whole range of DFI-related research. In recognizing that a firm’s competencies require adaptation in a foreign context a great deal of international development planning requires rethinking in a manner similar to the effect that new growth theory had for the economics of development. Just as technology can no longer be assumed an external factor to development, so too the ability of a firm to do what it is best at doing cannot be divorced from the context in which it does it. What is needed is further research into whether, how and to what extent the success and failure of the enterprise is tied to the world around it. We need a wealth and poverty of firms that ties in to a wealth and poverty of nations. In particular, what are the tangible and intangible links that bind the firm’s competencies to the culture and institutions of its home region? As a subset of this, why are some firms clearly able to operate more easily in foreign environments around the globe? Also, if certain firm competencies are better than others, are the institutions of some regions inherently better than others? It is supposedly easier to adapt what a firm does than what a region is in terms of its culture and institutions, but logically regions also evolve over time. Accordingly, what is the relationship between the evolution of firms and their competencies, and the evolution of the region they inhabit. Furthermore, what is the significance of context-specificity of production systems to development programs promoted by the WTO, the World Bank and others, which often promote the standardization of business institutions around the world? Is this kind of development practice equivalent to mono cropping competencies? While few would dispute that the development of the Toyota Production System has been a positive achievement for the world auto industry, without the unique conditions of post-war Japan

the TPS might have never emerged. Therefore, can innovations in production management like the TPS be tied to particular conditions in particular regions or conversely, can they be explained through the entrepreneurial skills of individuals?

These questions culminate in a larger question that is widely explored but so far unresolved: is foreign-direct investment positive to the development of an economy? Recent research related to hybridization would suggest that firms can develop deep links with their host regions through “localized development” – where competencies are developed on the basis of local endowments, and deployed then integrated in the knowledge of the parent firm and deployed globally (Fujita & Hill, 1995). Similarly, when a country aims to attract successful firms like Toyota, this is often done to introduce competencies that are seen as desirable to a local industry. However, if the foreign firm adapts its competencies to local institutions, is the host country getting what it bargained for? Connected to this question, one might inquire as to whether one should be adapting firm competencies, or locational endowments. For example, should Poland adapt its institutions to emulate those in Japan in order to stimulate the development of superior competencies in its industry, or should foreign firms adapt their systems to succeed in the context of the Polish system? More evidence is needed to illustrate this interaction between the firm and its environment. In particular, research needs to focus on dependencies between firm and its location to expose the how a firm derives its core strengths from the environment around it. For example, having established the characteristics of the four case study production systems in this thesis, it would now be invaluable to conduct a survey asking management to justify all observed adaptations in relation to the institutions and culture of Poland. To provide such answers one would also require a *much* better understanding of the impact of hybridization on the performance of the affected firms. Particularly, a follow-up research project might examine the changes in several measures of performance that have accompanied each adaptation of the productions systems of the four case study firms. More evidence needs to be collected on practical measures such as defect rates and worker productivity as far as the manufacturing industry is concerned. Initial anecdotal evidence from within this study itself suggests that subsidiary operations have been able to achieve performance nearing their parent facilities in some cases, but more extensive evidence is certainly

required. Finally, the existing characterizations of the “Japanese management system” as described in chapter three are far too dependent on the well-studied and documented case of the Toyota Production Systems. In this case, are the current models of lean production and the Japanese management system representative of the Japanese manufacturing enterprise? As some recognize, the Japanese enterprise is far from homogenous within the manufacturing industry itself, let alone across industries. Accordingly, more research is needed to characterize the production systems of the mass of Japanese firms beyond the stereotypical model of firms like Toyota.

6.3 CLOSING REMARKS

It is interesting to reflect about the potential implications of this thesis, for hybridization more generally, notably with respect to other firms in the auto industry, other industries and sectors, and to questions that reach beyond the sub-discipline of economic geography itself. In this context, a basic point to emphasize is the generality of hybridization processes as firms internationalize.

First, it is important to once again reiterate that the Japanese firm is not a homogenous entity, but it does nonetheless exhibit some common characteristics, as is widely recognized (Aoki & Dore, 1994). The case study firms presented in this thesis include two of the best-known Japanese auto manufacturers, as well as two more peripheral firms, which have not received much attention in the literature. Nonetheless, although the patterns varied, all four firms experienced notable degrees of hybridization of their operations as they internationalized, and this result is consistent with other studies in the auto and other industries. Moreover, the (interdependent) learning and bargaining processes that underlie hybridization are not restricted to Japanese firms. Hybridization may be easier to highlight in the context of Japanese DFI because Japanese firms developed such distinctive features. Nevertheless, the principle of hybridization operates more widely, indeed relentlessly. Indeed, Second, the theoretical framework behind the concept of hybridization is not necessarily specific to the manufacturing industry it stands to reason that any firm engaging in international operations would to some extent be subject to the processes of transfer, adaptation, and learning described in the model of

hybridization, as revealed, for example, in Reiffenstein's (2002) analysis of exports that featured "crossing cultures".

Finally, a broader implication coming out of this thesis is the need for geographers to heed the role played by culture and regional institutions in economic and social activity. Specifically, this research demonstrates that the transfer of ideas, technology, people and things is far from a straightforward process. Rather such transfers almost invariably mean adaptation in relation to the differences between donor and host regions. Regional differences are therefore highly significant to studies across the sub-disciplines of geography. Geographers have long focused on the interaction of differences across space and between places, and this interaction is often approached from the perspectives of transfer and adaptation processes. However, the contribution in this thesis is to emphasize that transfer and adaptation occur as a function of difference between regions. Furthermore, in highlighting the significance of the region as a unit of analysis, this thesis suggests an embedded, path-dependent, and evolutionary quality of place be adopted in geography, whatever the empirical focus. Accordingly, hybridization is significant in geography wherever "cultural differences contingently and conflictually touch" (Bhabha, 1994, p.206). For Whatmore (2002), in her explicit search for hybrid geographies, hybridization relates human-nature relations and the interface between people and regions, but the significance of hybrids reaches well beyond human ecology. For example, the hybridization perspective has powerful implications for the diffusion of "best-practices", be they in the context of productive organization as was the focus of this thesis, or of divergent topics such as the standardization of regional policy in a complex regional environment like the European Union (Paraskevopoulos, 2004). These examples show that with the recognition that complex regional patterns of culture matter to economic and other human activity there is the opportunity to bring the region as an institution into focus within research in the discipline of geography.

In conclusion, this thesis has explored the concept of hybridization in the context of Japanese subsidiaries in the Polish auto manufacturing industry. Evidence suggests, that Japanese lean production competencies are being modified as they are transferred to branch plants in Poland. These findings supplements similar studies in East Asia and the United States and give more weight to the argument that the superiority of lean

production is dependent on its geographic context. While early pundits of lean production were wrong to assume that the success of firms like Toyota is due to the protectionism and working culture of Japanese society, they were right in the claim that lean production is indeed tied to institutional and cultural factors present in Japan. The findings in this thesis are good news to manufacturing industry around the world in the sense that a diversity of production systems can successfully coexist as long as institutions and culture differ across regions. They are also a reminder to the leaders of Poland that its culture and institutions bear heavily on the behaviour and success of foreign investors and attention should be paid to whether the emerging hybrid systems are desirable to the long-run development of Polish industry.

APPENDICES

APPENDIX A - CRITERIA USED TO EVALUATE HYBRIDIZATION INDEX

- 1) Work organization and administration
 - a) Job classification: number of job categories is:
 - (1) 50 or more
 - (2) 11-50
 - (3) 6-10
 - (4) 3-5
 - (5) 2 or less
 - b) Wage system
 - (1) Rigid and detailed JC system determines wages
 - (2) Simplified JC system determines wages; PE do not determine wages
 - (3) Simplified JC system is introduced; PE system determines wages
 - (4) Wages determined mainly by length of service, and partly by objective PE that includes worker input and requires worker approval
 - (5) "Person-centred" wage determination where main criteria is: length of service (Nenko); personal evaluations (PE) conducted by supervisors, and closed to workers
 - c) Job Rotation (JR)
 - (1) JR is nonexistent; job assignment is rigid
 - (2) Rigid job assignment is moderated to some extent (job assignment when product mix is changed; frequent product mix, etc)
 - (3) JR is frequently conducted with work teams
 - (4) JR is planned and frequently conducted within but not beyond teams
 - (5) JR is carefully planned and frequently conducted within and beyond teams. Its clear aim is training of multiskilled workers (e.g. training table kept by team leaders and supervisors).
 - d) Education and training
 - (1)
 - (a) OJT is not emphasized
 - (b) No special inside training program for team leaders or maintenance personnel
 - (2)
 - (a) OJT is not emphasized; some arrangements exist for outside training (i.e. reimbursement of school fees)
 - (b) Outside education and training is recognized as job qualification
 - (3)
 - (a) OJT is emphasized; team leaders have some responsibility for training workers; team leaders have assistants for task training

- (b) Some training programs for team leaders and maintenance personnel exist inside or outside the company
 - (4)
 - (a) Workers trained through OJT and special preparations and arrangements are made to accommodate this
 - (b) Training of supervisors (team leaders) and maintenance personnel in Japan; special training programs and facilities (e.g. training centre)
 - (5)
 - (a) OJT is the main system for training multiskilled workers, together with long-term systematic training, and
 - (b) There is a training system for team leaders and maintenance personnel through OJT and systematic training; sending trainees to Japan and bringing trainers from Japan with special training programs and facilities
- e) Promotion
 - (1)
 - (a) Based on seniority and utilizing job posting
 - (b) High percentage of supervisors recruited from outside the company
 - (2) Based on seniority and PE conducted and utilization of job postings
 - (3)
 - (a) Based on PE and specific qualifications; seniority does not play a strong role; job postings
 - (b) Supervisors internally promoted through job postings; corporate skills significant; seniority rule is not rigid
 - (4)
 - (a) Based to some extent on the length of service (Nenkoh)
 - (b) Internal promotions to supervisor with recommendations by direct supervisor
 - (5)
 - (a) Worker promotion based on length of service(Nenkoh) and PE, which is conducted by direct supervisors
 - (b) Internal promotions to supervisor with recommendations by direct supervisor
- 2) Production Control
 - a) Equipment
 - (1) 0% from Japan
 - (2) 25%
 - (3) 50%
 - (4) 75%
 - (5) 100%
 - b) Quality Control (QC)
 - (1) Quality checks by QC specialists on completed products (post process and outgoing inspections) are emphasized
 - (2) QC relies on checks by specialists from an independent QC section; relatively close checks are conducted during each process (number of QC specialists is relatively low)

- (3) QC conducted by specialists during each process; QC and quality checks by specialists from an independent QC section also emphasized (high proportion of such checks)
 - (4) QC conducted by workers during the process but there are insufficient accommodations for this (e.g. workers have no lin-stop authority; QC or zero defect (ZD) circles are not very active)
 - (5) Emphasis on QC conducted by workers during the actual process
- c) Maintenance
- (1) Maintenance personnel employed mainly from outside and maintenance by engineers is emphasized
 - (2) Same as (3) but experienced workers are sometimes hired directly as maintenance personnel
 - (3) Experienced workers hired separately but receive additional internal training before being promoted to maintenance personnel; shop floor workers do not have any commitment to maintenance
 - (4) Same as (5) but including some experience workers hired separately from outside; preventative maintenance and shop floor workers' roles in maintenance are not stressed
 - (5) Shop-floor are internally trained and promoted to maintenance personnel (including inexperienced workers hired separately from ordinary workers); preventative maintenance is emphasized, shop floor workers have some maintenance roles
- d) Operations Management
- (1) Operations control is highly engineering-oriented (engineering section has dominant role in machine operation and maintenance; production based on large-lot methods)
 - (2) No specific provisions for coping with line fails or defects; operations control is engineering-oriented; local IE specialists establish and modify standard procedures
 - (3) Moderate product mix (relatively large lot size with some batch production, etc.) standard procedures and work manuals brought in from Japan but only slight modification to accommodate local conditions
 - (4) Setup is less flexible than (5); work manuals and maintenance know-how obtained from Japan; local job improvement (kaizen) is achieved to a much lesser extent; lot size is relatively small; die-change time is approximate, though slightly less than that in Japan
 - (5) Flexible setup and special arrangements to cope with line failures or defects (e.g. coordination and cooperation among first-line supervisors and team leaders, preventative maintenance, machine fail-safe devices, production control signal board; standard procedures and work manuals brought from Japan and modified and improved to accommodate local conditions (line balance adjustments); high product mix, frequent product change; reduction of die change time is achieved to the same extent as in Japan
- 3) Procurement
- a) Local Content

- (1) More than 80%
- (2) 60-80%
- (3) 40-60%
- (4) 20-40%
- (5) Less than 20%
- b) Suppliers
 - (1) Most procurement from local suppliers
 - (2) Procurement from Japanese suppliers in Poland / Europe, but proportion of these suppliers is high
 - (3) High proportion of procurement from Japanese suppliers in Poland / Europe
 - (4) Procurement from sister plants or Japanese suppliers outside of Japan
 - (5) Materials and parts procured mainly from Japan
- c) Procurement Method
 - (1) Mainly spot trading with local suppliers; parts inventories are relatively high in order to cope with delayed delivery
 - (2) Local suppliers are held to strict observance of delivery times
 - (3) Some arrangements made to reduce parts inventory as much as possible; technological assistance is attempted with local suppliers
 - (4) To some extent the Japanese subcontracting system exists with local suppliers; technological assistance and long-term contracts are applied to local suppliers
 - (5) Japanese subcontracting system exists with local suppliers
- 4) Group consciousness
 - a) Small group activities
 - (1) No small group activities
 - (2) Less than 20% of workers participate, or only in special “model” cases; some emphasis is placed on meetings and suggestions for quality and productivity
 - (3) 20% to 50% of workers participate
 - (4) More than 50% participate
 - (5) All workers participate voluntarily and play significant roles
 - b) Information sharing
 - (1) No special provisions for information sharing
 - (2) Meetings are held before work begins
 - (3) Attempts are made at information sharing at all levels of the company through meetings and other means
 - (4) Various provisions exist for information sharing but to a lesser extent than in (5)
 - (5) Company-wide information sharing and communication actively practiced; meetings for all employees, president meets all employees in small groups, vigorous small group activities, open-style offices
 - c) Sense of Unity
 - (1) There are no special practices
 - (2) Only some social events are held
 - (3) Only some of (4) and (5) practiced

- (4) Many of the devices and practices in (5) are implemented but to a lesser extent (e.g. uniforms are not compulsory)
 - (5) Various devices such as company uniforms for all employees, open parking, social events, morning ceremonies, etc.
- 5) Labour Relations
- a) Hiring Policy
 - (1) No special selection criteria for hiring; plant located in a traditionally industrial area
 - (2) Special hiring considerations only if plant is located in a traditionally industrial area
 - (3) Plant site selected where there is a homogenous workforce; if plant site is traditionally industrial area, applicants are selected with care
 - (4) Applicants are selected with care; plant site selected where there is a homogenous work force
 - (5) Applicants are carefully, meticulously screened; plant site selected where there is a homogenous workforce
 - b) Job Security
 - (1) Layoffs are prone to occur if at all likely
 - (2) Layoffs are avoided as much as possible but have occurred many times
 - (3) Layoffs are avoided as much as possible but have occurred on rare occasion
 - (4) Layoffs are avoided as much as possible but this policy is not explicit and there have been layoffs; provisions for long-term employment
 - (5) Explicit (written) no-layoff policy that seeks to avoid layoffs as much as possible; provisions for long-term employment
 - c) Labour Unions
 - (1) Union is 100% organized and there have been strikes
 - (2) Union exists but has relatively low membership; there have been strikes but otherwise the union is not very active
 - (3) There is a union and a cooperative tendency with the union (management labour consulting system exists; or there is yet no union but there have been organization drives
 - (4) There is no union but some problems in labour relations (attempt at organizing a union); or there is a union but relations are very cooperative
 - (5) There is no union and labour relations are peaceful
 - d) Grievance Procedures
 - (1) There is a union and official grievance procedures; there are many grievances; grievance procedures include external arbitration
 - (2) There is a union and official grievance procedures; grievances tend to be resolved on the shop-floor
 - (3) There is a union, and official grievance procedures are formalized, but emphasis is on shop-floor and through managerial channels
 - (4) There is no union and personnel department intervenes in the process of resolving grievances or there is a union and grievances are resolved on the shop-floor

- (5) There is no union and grievances are resolved mainly on the shop floor and through managerial channels
- 6) Parent-subsidiary Relations
 - a) Ration of Japanese expatriates:
 - (1) Less than 1%
 - (2) 1 – less than 2%
 - (3) 2 – less than 3%
 - (4) 3 – less than 4%
 - (5) More than 4%
 - b) Delegation of Authority
 - (1) Subsidiary makes and approves its own plans
 - (2) Subsidiary makes plans for approval by parent
 - (3) Subsidiary submits plants and parent evaluated and gives or withholds approval
 - (4) Subsidiary submits suggested plans and parent decided
 - (5) Parent in Japan makes plans and decision
 - c) Managerial positions of Poles
 - (1) President is Polish and all important positions are held by Poles
 - (2) President is Polish and majority of important positions held by Poles
 - (3) Japanese and Poles share management positions and important positions roughly equal
 - (4) President is Japanese and many important positions are held by Japanese
 - (5) Most important senior managerial positions, including president, are held by Japanese
- 7) Community Relations
 - a) Donations and Volunteer Activities
 - (1) There is a highly organized special section dedicated to community relations and have successfully achieved “good corporate citizenship”
 - (2) There is a section staffed by Polish specialists and there is an attempt to carry out the same type and degree of activities as other Polish companies
 - (3) There is a great deal of donation activity, employees are encouraged to participate in local volunteer activities
 - (4) Donations are made to some extent and Japanese management play somewhat active role in this
 - (5) Very little activity or intent to be good corporate citizens

APPENDIX B - INDEX CRITERIA SUITABILITY

<i>Production System Element / Compatibility with Polish context: (Scale 3 = complete, 2 = requires modification, 1 = incompatible)</i>	
Work Organization and Administration	2.6
Number of Categories	3
Wage System	2
Job Rotation	3
Education and Training	3
Promotion	2
Production Control	2.75
Equipment	2
Quality Control	3
Maintenance	3
Operations Management	3
Procurement	2.33
Local Content	2
Suppliers	2
Procurement Method	3
Group Consciousness	2.66
Small group activities	3
Information sharing	3
Sense of Unity	2
Labour Relations	3.00
Hiring Policy	3
Job Security	3
Labour Unions	3
Grievance Procedures	3
Parent- Subsidiary relations	2.66
Ratio of Japanese Expatriates	3
Delegation of Authority	2
Managerial positions of Poles	3

APPENDIX C - INDEX ELEMENTS REQUIRING MODIFICATION

<i>Element</i>	<i>Modification required</i>
Wage System	The wage system in Poland in the manufacturing sector and elsewhere is dominated by a monthly salary system, and supplanted by a common 13 th month bonus. This system is closer to Japanese experience than the typical American hourly wage system. In this case, a factory utilizing a salary system is not automatically considered to score a 4 or 5 on the application scale. Factors such as the implementation of a Polish (13 th month) versus Japanese (P.E.) bonus system must be considered.
Equipment	In several cases, equipment was neither locally derived, nor brought in from Japan, but rather contracted out to a Western European firm by HQ in Japan. This presents an interesting dilemma, because while the specifications and planning for the equipment were clearly of Japanese origin, the execution was far removed from Japan. This type of situation demonstrates an interesting balance between application and adaptation and does not readily fit into the classification system adopted at the beginning of this study. Perhaps, this situation demonstrates the ultimate in hybridization, where a Japanese designed production system is built and executed through a quasi-local actor. In this case, equipment purchased from local (or EU) suppliers on the basis of Japanese specifications will be considered a score of 3 indicating perfect hybridization.
Local Content	The definition of what constitutes local content creates some difficulties in the case of Poland and its position within the European Union. Suppliers located within the EU can on one hand be considered "local" because of their adaptation to a common regulatory framework. On the other hand, suppliers in western Europe are not necessarily adapted to the post-socialist transition experienced by Polish industry. For the purposes of this analysis then, suppliers within the EU will be considered local.
Suppliers	Modifications are required on several points w.r.t. this element. First, technological assistance was rarely offered to local suppliers not because there was no desire to pursue a Japanese subcontracting model, but because the facilities themselves are fairly new, and are therefore deemed ill prepared to offer technological assistance at this early stage. In the words of one manager: "we are still learning the pattern".
Sense of Unity	Previous analyses of this nature have put tremendous emphasis on the role of employee uniforms in creating a sense of unity. This may be a valid measure in the USA, where uniforms are not traditionally enforced in the manufacturing industry, but this is not the case in Poland. Traditionally, Polish workers are expected to wear uniforms, that is, of similar appearance and function though not necessarily bearing a company logo. Accordingly, the presence of uniformed workers does not in itself indicate a desire to promote a sense of unity.
Delegation of Authority	Several factors affect the suitability of this element. First, in several cases, managers were neither Polish, nor Japanese, but either western European, or American. Second, often, the final authority in terms of planning for the facility came from a European HQ rather than from within the facility itself or from HQ in Japan. European HQ are used because they are familiar with the business environment within the European Union and are seen as better able to direct facilities in Poland. While this shows a form of adaptation to local practice, it does not specifically represent adaptation to Polish practice. Nonetheless, the fact that European HQ are responsible as opposed to HQ in Japan means that this behaviour will be treated as adaptation behaviour for the purposes of this study.

APPENDIX D - INTERVIEW SCHEDULE

INFORMATION ON PRODUCTION ENVIRONMENT

Work Organization

1. (I-1) How many job categories are there on the shop-floor? (specify what they are if possible)
2. (I-2) What factors determine the wage of each worker:
 - a. Length of employment? YES / NO
 - b. Performance evaluations? YES / NO
 - c. Job category? YES / NO
 - d. Other? _____
3. (I-3) Is work done in teams? YES / NO
 - a. Comment
4. (I-3a) Do workers rotate between tasks? YES / NO
 - a. Comment
5. (I-4) Which of these forms of training are used:
 - a. (I-4a) On-the-job training? YES / NO
 - b. (I-4b) Pre-job training YES / NO
 - c. (I-4c) Outside training YES / NO
 - d. (I-4d) Other (describe)
6. (I-5) Are there supervisors on the production line? YES / NO, If YES:
 - a. (I-5a) Are supervisors recruited from:
 - i. Among shop-floor workers? YES / NO
 1. What determines promotion to supervisor:
 - a. Seniority? YES / NO
 - b. Performance Evaluation? YES / NO
 - c. Other: _____
 - ii. (I-5b) From outside? YES / NO
 - iii. (I-5c) Other (describe)
 - b. (I-6) What is the function of supervisors? Do they:
 - i. (I-6a) Function as team leaders? YES / NO
 - ii. (I-6b) Have technical control of the production process? YES / NO
 - iii. (I-6c) Have control of industrial engineering functions? YES / NO
 - iv. (I-6d) Other (describe)

Production Control

7. (II-1) What proportion of your production equipment comes from Japan?
 - a. (II-1a) Where does the rest come from?
8. (II-2) Who is responsible for Quality Control?
 - a. Production workers during production process? YES / NO
 - b. QC specialists on completed products? YES / NO
 - c. Other _____
 - d. Comments
9. (II-3) Who conducts maintenance on the production line?
 - a. (II-3a) Production workers trained for this task? YES / NO

- b. (II-3b) Maintenance personnel hired specifically for this task? YES / NO
- c. (II-3c) Outside personnel and engineers? YES / NO
- d. (II-3d) Other (describe)
- 10. (II-4) Is there an emphasis on continuous preventative maintenance? YES / NO
- 11. (II-4a) Are machine fail-safe devices used (*Pokayoke*)? YES / NO
- 12. (II-4b) Is a production signal board used (*Andon*)? YES / NO
- 13. (II-4c) Is production done in small batches (small-lot production)? YES / NO
- 14. (II-4d) Is there a high average product mix? YES / NO
- 15. (II-4e) Are Japanese work manuals adjusted to local conditions? YES / NO
 - a. If YES, comment on the adjustments:

Procurement

- 16. (III-1,2) Roughly, what is the local content of your finished product? _____ %
- 17. (III-3) Is a just-in-time system used with local suppliers? YES / NO
 - a. (III-3b) How frequent are deliveries?
 - b. (III-3c) Are long-term contracts awarded to local suppliers? YES / NO
 - c. (III-3d) Is technological assistance offered to local suppliers? YES / NO
 - d. Comments

Group Consciousness

- 18. (IV-1) Do workers participate in small-group activities? YES / NO
- 19. (IV-2) Is information shared practices company-wide? YES / NO
 - a. (IV-2a) Meetings with all employees? YES / NO
 - b. (IV-2b) Open-style offices? YES / NO
 - c. (IV-2c) Management meets with small groups? YES / NO
 - d. (IV-2d) Other (describe) _____
 - e. Comments
- 20. (IV-3) Is a sense of unity among workers actively promoted through:
 - a. (IV-3a) Uniforms for employees? YES / NO
 - i. If YES, are uniforms compulsory? YES / NO
 - b. (IV-3b) Open/shared parking for employees and management? YES / NO
 - c. (IV-3c) Company sponsored social events? YES / NO
 - d. Other (describe)

Labour Relations

- 21. (V-4) Was hiring done from within a traditionally industrial workforce? YES/NO
 - a. (IV-4a) What are the main hiring criteria for new workers?
- 22. (V-5) Is there an emphasis on long-term employment? YES / NO
 - a. (IV-5a) Is there an explicit no-layoff policy? YES / NO
 - b. Comments:
- 23. (V-6) Are workers unionized? YES / NO
 - a. If YES:
 - i. (V-6a) Have there been strikes? YES / NO
 - ii. (V-6b) What is the level of membership? _____ %
 - b. If NO:
 - i. (V-6c) Have there been attempts to organize a union? YES / NO
- 24. (V-7) Do you have specific grievance procedures? YES / NO
 - a. If YES, what are they?
 - b. Is there an emphasis on resolving grievances:

- i. (V-7a) On the shop-floor? YES/NO
- ii. (V-7b) Through managerial channels? YES / NO
- iii. (V-7c) Other (describe)

Parent-Subsidiary Relations

- 25. (VI-1) How many Japanese managers and employees work at this facility?
 _____ Japanese out of _____ total employees and managers
- 26. (VI-2) Are management decisions at this facility made independently from the Japanese parent-firm? YES / NO
 - a. (VI-2a) Does this facility make its own plans? YES / NO
 - b. (VI-2b) Does this facility approve its own plans? YES / NO
- 27. (VI-3) Are top management positions held by Japanese managers? YES / NO
 - a. (VI-3a) Is the president Japanese? YES / NO
 - b. (VI-3b) What are the functions of Polish managers?

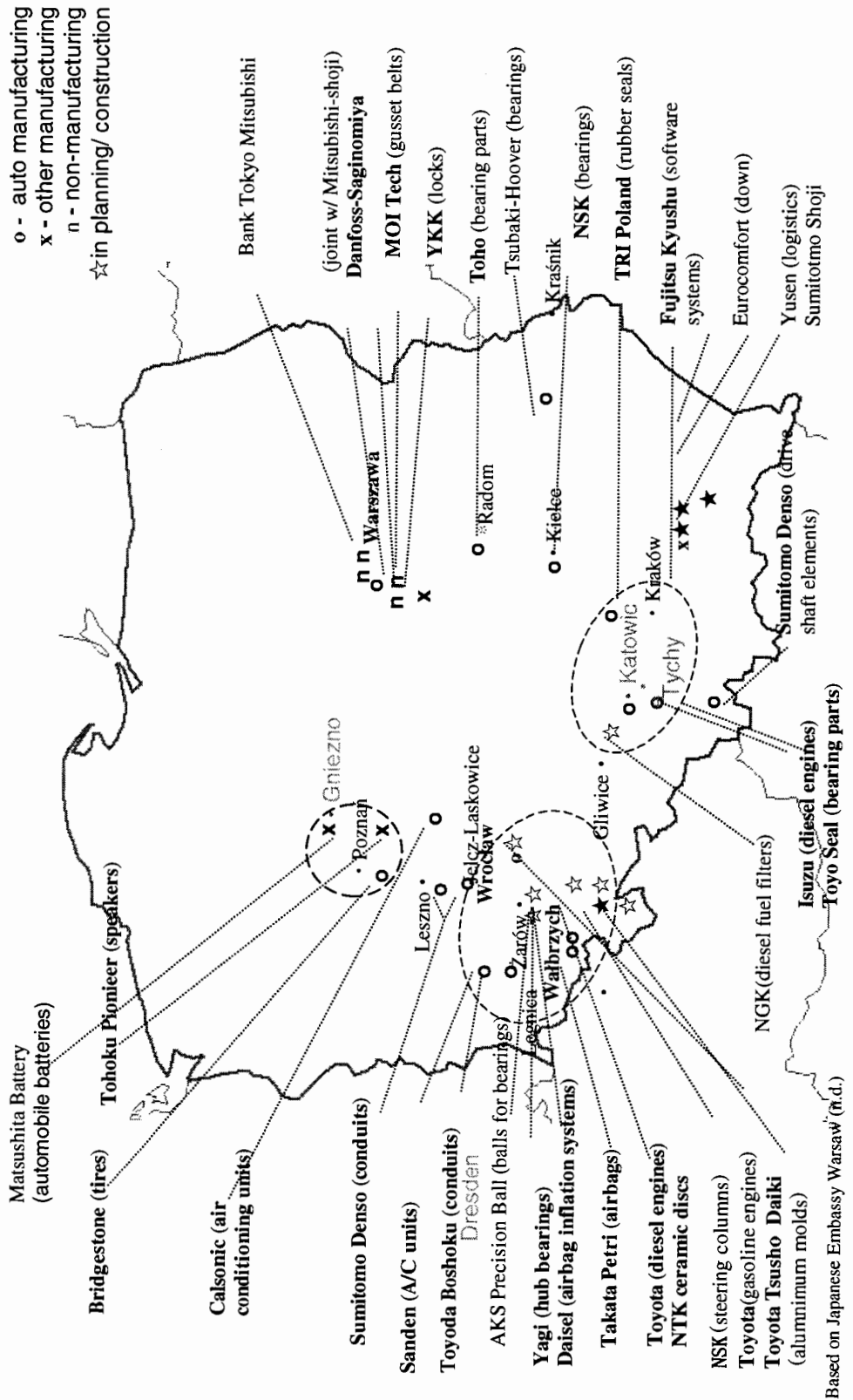
Community Relations

- 28. (VII-1) Does this company engage to a large extent in the affairs of the community? YES / NO
 - a. Do employees participate in volunteer activities? YES / NO
 - b. Do you have staff dedicated to community-relations? YES / NO

Performance Indicators

- 29. (A-1) How is the plant performing in each of the categories
 - a. Estimate how many units are produced per day (week, month)?
 - b. Estimate the defect rate?
 - c. Estimate the employee absenteeism rate? _____
 - d. Estimate the employee turnover rate? _____
 - e. Other important indicator (specify) _____
- (A-2) Please comment on the most important adjustments made on the shop-floor as result of locating in this community in Poland?

APPENDIX E - GEOGRAPHY OF JAPANESE DFI IN POLAND



Based on Japanese Embassy Warsaw (n.d.)

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