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## THE DRIVERS OF THE DEVELOPMENT OF HIGH VALUE ADDED MANUFACTURING IN EUROPE

A Qualitative Exploration of High Value Added Manufacturing Firms in Finland

Anette Maria Esteri Järvinen

International Business  
Bachelor's Thesis  
Supervisor: Susan Grinsted  
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<b>Objectives</b>  The main objectives of this study were to examine the benefits of high value added manufacturing (HVM) and its potential as a strategic approach by means of qualitative research. The research was conducted to understand the sectors adopting HVM and uncover the benefits of this type of manufacturing.
<b>Summary</b>  The main approaches of high value manufacturing are customer-based solutions, 'just in time' manufacturing, and lean implementation to establish innovative manufacturing. The key benefits of HVM on a company's strategy are in terms of cost savings, increase in efficiency and waste reduction, increase in profitability, improved customer approval, and a sustainable competitive advantage, as well as benefits on a country's economy and the environment. Companies can utilize HVM as a strategic approach to increase profit margins and maintain competitiveness in the industry. The qualitative interviews were conducted with HVM companies in Finland.
<b>Conclusions</b>  The main drivers for HVM adoption were found to be an increase in value creation and the ability to obtain a sustainable competitiveness in a developed country environment. The main benefits of HVM were found to be profit and value benefits including cost savings, efficiency improvements, waste reduction, and an increase in customer satisfaction. The economical and environment benefits included employment provider, recycling and overall sustainable manufacturing with a positive impact on the economy's wealth.
<b>Key words:</b> <i>HIGH VALUE ADDED MANUFACTURING, MANUFACTURING SECTOR, EUROPE, STRATEGIC APPROACH</i>
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## **1. INTRODUCTION**

The aim of this research is to study the new phenomenon of high value added manufacturing in order to determine the potential for this approach to improve the manufacturing sector in Europe. The research will focus on types of sectors and companies that have shifted their manufacturing to create greater value for all stakeholders. Firstly, high value manufacturing will be defined and evaluated. Then, recent research on companies undergoing transformation will be examined to determine the benefits of high value manufacturing. Furthermore, high value added manufacturing companies will be investigated to determine the potential for it to become a strategic approach for companies to maintain their sustainability. Finally, the main findings of the investigation will be relayed along with suggestions for further research on this topic.

### **1.1. Background**

High value added manufacturing (HVM) is an innovative approach to ensure competitiveness in the global market compared to the traditional manufacturing. High value added manufacturing is described as the use of innovative processes (Martinez, Neely, Guanjie, and Smart, 2008). HVM is utilized to help maintain profitability for the company and benefit society (Livesey, 2006; Martinez et al., 2008). HVM entails particular expertise which results in higher quality and salaries. This type of manufacturing also benefits the environment as companies utilize production processes that are less harmful to the environment thus ensuring overall environmental stability (Livesey, 2006). Overall, high value added manufacturing produces value in several ways internally for the business and externally for stakeholders.

Offshoring, or moving low value manufacturing to developing countries has been a common strategic approach by companies. Most of the goods and services supplied from offshoring are low-cost (Martinez et al., 2008). On the other hand, Europe has been utilizing global supply chains to bring back offshored manufacturing (Stöllinger et al., 2013). One way is through high value added manufacturing as it produces

innovative, and value added products. This allows companies to specialize in particular activities and increase efficiency in the industry. There are several countries and companies which have been drivers for the development of HVM in Europe. Furthermore, this topic has not been greatly researched and thus it can be useful and practical to see why HVM has been developing in Europe in recent years and to see whether this type of manufacturing can be developed to potentially increase the reshoring of the manufacturing sector to Europe.

### **1.2. Research Problem**

The topic of high value added manufacturing is significant in relation to Europe's economic growth and sustainability. Globalization and the rise of emerging economies have led to a sharp decline in manufacturing production in Europe. Furthermore, this approach is fairly new and thus there is limited research on the benefits of HVM and its potential as a strategic approach. This demands a discussion on what are the drivers of HVM in Europe and what is its potential as a strategy for a company's sustainability.

### **1.3. Research Questions**

The aim of the study is find answers to the following questions:

1. What types of products and sectors are developing their manufacturing systems to high value added?
2. What are the drivers of this type of manufacturing in Europe?
3. How does the use of HVM impact the economic growth of Europe?

### **1.4. Research Objectives**

The following statements are the research objectives of the study:

1. To explore the companies in Europe that have been developing HVM into their manufacturing strategy.
2. To understand how companies are utilizing this type of manufacturing to improve their profitability.
3. To determine the drivers for using HVM in one's manufacturing operations, expose the advantages of using this type of manufacturing and predict the viability of HVM in Europe and its potential as a strategy for companies' sustainability.

### **1.5. Definitions**

In relation to this current study high value added manufacturing can be defined as a group of innovative approaches to manufacturing processes to create value for both internal and external stakeholders. High value manufacturing cannot be defined as one particular way or process that is of "high value" but rather it focuses on creating customer-based solutions, high brand recognition, fast delivery time, and utilizing other innovative methods in the manufacturing process to form high value creation that benefits the company and the society as a whole (Livesey, 2006). More importantly it can be concluded that high value manufacturers are not competing on cost alone and are trying to maintain a competitive advantage that is sustainable (Martinez et al., 2008).

## **2. LITERATURE REVIEW**

### **2.1. Introduction**

This literature review provides a basic introduction to the theories of high value added manufacturing (HVM) in Europe. The topic has been reviewed and analyzed in a limited number of scholarly sources. The purpose of this literature review is to understand the concepts of HVM and the European policy of manufacturing and analyze its applications in Europe. Furthermore, the literature review will discuss the benefits of high value added manufacturing as a strategic approach for companies.

### **2.2. High Value Added Manufacturing**

High value added manufacturing goes beyond the idea of traditional manufacturing, or transforming raw materials into finished products because HVM increases the value of the finished product. HVM cannot be defined as one process or way of manufacturing, but rather it is a multitude of different innovative changes in the manufacturing process that increases the value of the end product. This paper will define the different applications of adding value to manufacturing and discuss the effects that this type of manufacturing has on a company's profitability and sustainability.

#### **2.2.1. What is High Value Added Manufacturing?**

High value added manufacturing is a revolutionary approach to manufacturing. The value added is generated in many ways and affects the entire manufacturing process and thus it cannot be defined as one thing. In general, it involves utilizing knowledge-based expertise and innovation during the manufacturing processes and it encompasses services to create products (University of Cambridge, 2016). More specifically, Livesey (2006) defines HVM as utilizing "unique production processes, high brand recognition, rapid delivery times, or highly customized services," to create value. More recently, Pearce and Pons (2013) concluded lean implementation as

another important approach that is necessary in high value manufacturing. Lean thinking is used in high value manufacturing to diminish waste in terms of physical, time and effort (ibid). As a result, these HVM companies are not chiefly competitive in terms of cost. Martinez et al., (2008) go as far as to say that companies who are competitive in other ways than price can be considered high value manufacturers.

Martinez et al. (2008), have expanded upon the definition by Livesey (2006), adding the value creation aspect of high value manufacturing. The researchers determined that high value manufacturers are creating value for their stakeholders through innovative processes of their products and services and are benefitting society in general. HVM manufacturers are placing more importance on creating value than the previous notion that the superiority in the process is the key in manufacturing (MacBryde, Paton and Clegg, 2013). MacBryde et al. (2013) go further with their analysis of HVM and conclude that it can be viewed as a way of servitization. This means it is a well-corresponded collection of manufacturing activities that generate customer-based solutions through the use of service. In basic terms, servitization is the idea of a physical product being sold as a service. Servitization allows suppliers to increase sales and decreases risks and the unpredictability of maintenance costs for customers (Neely, 2008). Overall, the literature shows consensus and development of the definition of high value manufacturing. In recent years researchers, have emphasized the value created by HVM and have expanded upon what high value manufacturing really means.

### **2.2.1.What types of manufacturers can utilize HVM?**

The types of manufacturers can be categorized into four different types as concluded by Livesey (2006). They include: service led producers, product manufacturers, service manufacturers, and system integrators. Product manufacturers are known as traditional manufacturers with their main expense being production costs and main revenue product sales. Cadbury Schweppes is an example of this type of manufacturer. Service led producers have high production ability which allows services to be their main revenue source, Rolls-Royce is an example of this type of

manufacturer. System integrators regulate the channel to customers and a production network external to their own. These integrators do sell products, but production is not part of their main expenses, GB Innomech is a system integrator company as it focuses on design customization and R&D. Lastly, service manufacturers have little production and instead provide services that create value, IBM is one such example as they focus on software services (Livesey, 2006). Figure 1 highlights the majority of revenues and costs for each type of manufacturing. Each type of manufacturer has the ability to introduce HVM.

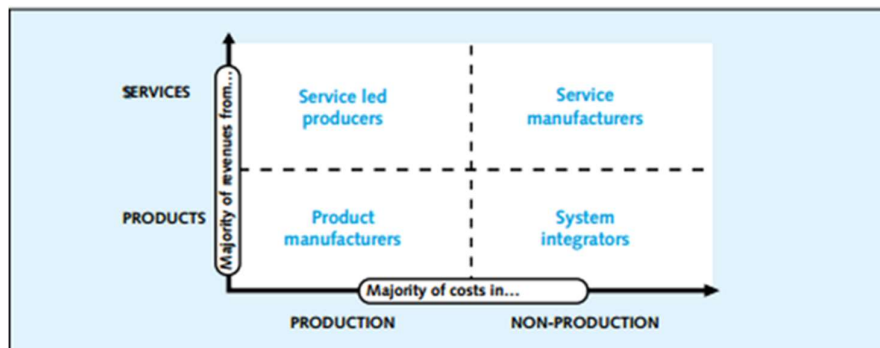


Figure 1: Types of manufacturers (source: *Defining High Value Manufacturing*, Livesey, 2006).

This means that HVM is open to all manufacturers and while some companies or sectors have better capabilities with this type of manufacturing, any type of company can move to HVM (Livesey, 2006; Leiringer and Green, 2009).

The manufacturers that have moved to HVM are seen as “inventors, innovators, global supply chain managers and service providers,” (Livesey, 2006). Furthermore, the idea of production has also changed and these HVM manufacturers are focusing on a combination of “production, research, design, and service provision,” (Livesey, 2006). The study conducted by MacBryde et al. (2013) illustrates that companies are focusing on manufacturing activities that also include design strategy, creation, and service work, thus they are adding value in areas other than their core production. This shows change in the definition of what a manufacturer is and does with the addition of high value. The manufacturers have more potential to play a crucial part in the product life cycle and be relevant and important in the overall economy.

## **2.2.2. Where in the manufacturing process is HVM applied?**

HVM can be introduced in either the upstream or downstream areas of the process as the value added is well integrated into the solutions. The most crucial part is each company must have a solid base in terms of the systematic integration. This ensures that all the activities are properly combined to form a complete product life cycle (Yang, Luo, Li, Yang, and Lee, 2013). Although, Chen (2000) agrees with the idea that HVM can be added anytime in the process he argues that value added implementation is more important in the early stages of the product lifecycle. This is because if the product is not desired in the target population and the manufacturer decides to produce it, any type of innovative design will not be beneficial nor create value for the manufacturer. Overall, implementing high value into manufacturing does not need to be done at a specific phase nor does it involve a specific addition; however, a smooth integration of high value activities requires the manufacturer to be attentive in the upstream decision-making phase of the product life cycle.

### **2.2.2.1. Stages of HVM activity**

Research has been conducted to determine what needs to be done by manufacturers who want to move to HVM. Bititci, Mendibil and Maguire (2010) found that the shift to HVM is only possible with the joint impact of several changes in the manufacturing planning and processing. The study by MacBryde et al. (2013) went one step further and categorized these fundamental changes into three separate stages. The first stage involves the transformation from simply being the supplier of a certain type of production to owning the entire product. Shifting to HVM means adding design capabilities such as taking out cost or adding quality to the design and thus transforming the company from being only a production facility to being considered a product company. The second stage converts a company from a product provider to provide both the product and the inclusive package encompassing the product. A high value manufacturer is the owner of the product during the entire life cycle because of the addition of certain skills in service and support. The final stage of movement towards HVM is going beyond being the provider of a lifecycle solution to also being

the provider of the complete customer solution. This means that HVM providers do not solely focus on a solution for a single product rather their entire product/service range satisfies the desires of their customers. At this stage, manufacturers have the ability to design and support a collection of products and services to create a product family. Overall, the study found that some sectors lack the resources and complexity to complete the full transformation from Stage 1 to 3 and with each shift customization of the product increases. The end result, is a company with capabilities to create sustainable service to their customers (MacBryde et al., 2013). Other research has concluded that the strategic shift to high value manufacturing only transpires with direction from a clear vision, for example the brand leadership strategy. This strategy advises and positively impacts the tactical and operational decisions made by the company (Bititci et al., 2010). This means that although the stages guide the movement to HVM, this process cannot be successful without a strategic vision.

### **2.2.3. What is the value added in HVM?**

High value activities focus on the value added into the manufacturing processes that results in more value to all stakeholders. High value added manufacturing creates value financially for the company and externally for the economy and environment (Livesey, 2006). This means that HVM shifts the importance of financial profitability to include benefitting more stakeholders, for example: the country's GDP and reducing the carbon footprint on the environment.

More specifically, the value creation that occurs with HVM has two key effects on the manufacturing process. Firstly, the operational activity of a typical product manufacturer is expanded upon and thus not a simple process. The second one, which is more specific to HVM, is the strategic focus on a smaller target population that results in a product more suited to that specific customer market (MacBryde et al., 2013). Martinez et al. (2008) concluded that manufacturers with emphasis on high value, focus on value propositions centered on "delivery of capability" rather than simply focusing on the product. With HVM the emphasis of the company is not on price reduction but rather innovation and customization.



However, Chen (2000) argues that the value added in HVM can only be created when certain things are synchronized and in place in the manufacturing process. First, it is important to understand that the high value activities are part of an integrated system. In order to achieve a high value product, the activity must carry correct information and coordinated communication that ensures innovation and technology at each step of the process. Overall, the literature develops a broad definition of the value created by high value manufacturing with in depth details still unknown. However, some researchers have also considered what needs to be in place in order to create the value for the end product.

#### **2.2.4. Why is there a need for High Value Added Manufacturing?**

Globalization has eliminated several trade barriers allowing for an easier flow of products and services. This has resulted in the popularity of low value added products emerging from developing countries. Increased competition has resulted as manufacturing is being offshored to these countries (Martinez et al., 2008). Developed countries are struggling to compete with these developing countries who can manufacture the products with a low cost and are thus price competitive (Bryson, Taylor and Cooper, 2013). The phenomenon of offshoring has resulted in an increased push for economic nationalism in Europe. There are desires to bring back offshored manufacturing activities and decrease the amount of jobs being lost in Europe especially in the critical time period of low economic growth (Stöllinger et al., 2013). Bringing back manufacturing can be possible with HVM. Companies from developed countries may be competitive with their knowledge in manufacturing products that are high in customization in both low and high technology sectors (Bryson et al., 2013). MacBryde et al. (2013) also found that innovative products with higher quality and companies with superiority in customer service and responsiveness are crucial in maintaining a competitive advantage in today's global economy. Additionally, Martinez et al. (2008) deepens this suggestion and advocates that competition is about value creation through a variety of high value activities that establish a well-balanced

collection of manufacturing processes. They added that competition is not about manufacturing products at high capacity and low cost.

Furthermore, global trends related to manufacturing have drastically changed particularly climate change and sustainability. Pressure of environmental changes and resource consumption will be placed on manufacturers and thus the manufacturer can impact the cycle of resource consumption. In particular, the processes of systematic development of technology, product design, general lifecycle, and recycling or disposal of the end product. Future manufacturing must be efficient and greenhouse gas emission must be reduced to help counter the negative effects of pollution (Martinez et al., 2013). HVM provides materials that increase resource efficiency and ensures intellectual design and production that is environmentally friendly (O'Sullivan, 2011). It can be concluded from the literature that the challenges faced by manufacturers can be reduced with products that use the constructs of the high value approach to manufacturing.

#### **2.2.5.Overall Benefits of HVM**

An evaluation of the overall benefits of high value manufacturing reveals key information on the potential of HVM as a manufacturing strategy. The literature provides three main benefits that high value manufacturing can provide: reduction of costs in production resulting in greater output than input value, societal and economic benefits, and environment sustainability. However, there are some limitations, due to the novelty of HVM, as there is limited literature on this subject and much of the benefits have only been researched over a short time period.

##### **2.2.5.1. Profit and Value Benefits of HVM**

One of the main benefits of HVM is the reduction of costs in production which results in the value of the output being greater than input. Livesey (2006) concluded that companies with HVM are financially performing very well. One such example is

Cadbury Schweppes who has seen continuous growth with the use of high value process changes. HVM includes 'just in time' manufacturing. This shift from maintaining products in a warehouse to only focusing on sales and producing products when needed has resulted in a drastic reduction of inventory costs for several manufacturers (Bryson et al., 2013). The reduction of inventory costs results in a decrease in production costs which further shifts the value to the output. Key measures such as customer approval, efficiency, turnover ratio, and overall profitability have been improved with the use of HVM (Bititci et al., 2010). More specifically, Pierce and Pons (2013) noted that the lean approach in HVM increases production efficiency. High value manufacturing also allows for innovation with the use of technology to increase automation and decrease employee numbers leading to a growth in profit margins (Bryson et al., 2013). Research from Yang et al. (2013) is in accordance with the previous researchers and added that certain knowledge-based synergies that are included in the scope of HVM will improve the market worth of the products. The researchers further concluded that manufacturing that creates high value fulfills consumer demands and helps create a sustainable competitive advantage for the company. There are, however, discrepancies in the literature on this topic. Piorkowski, Gao, Evans, and Martin (2013) agreed that the industry of HVM is correlated to an increase in market share, productivity, and shareholder value, but found that there is potential for these companies to be more profitable. They concluded that a HVM company will gain a greater profit margin if employees are able to exploit product demand and limit the use of complex operations in order to increase returns and decrease expenses. The research focused on the evolving employee management in HVM companies to increase profitability. This sections highlights the research that has been done to conclude that high value manufacturing has the potential to create profit and value benefits. However, more longitudinal research must be done to confirm this idea and increase its credibility.

#### **2.2.5.2. Societal and Economic Benefits**

Research also has found HVM to be beneficial for the country's economy and the society as a whole. In 2006, research by Livesey highlighted a significant correlation

between HVM companies and national R&D investment and societal improvement, in particular, contributing to a country's economy financially. Dunkerton and Bustard (2013) claimed that the industry of HVM is a key player in contributing to a country's wealth and overall GDP. Further research illustrates a correlation between exports of products made from high value manufacturing and overall economic growth (Carvalho, Ribeiro, and Santos, 2013). University of Cambridge (2016) found that HVM has been beneficial economically and in terms of increasing growth for the United Kingdom. Their research concluded that 275 billion pounds of gross added value was added to the national economy per annum by the HVM industry. Bititci et al. (2010) found that HVM created an overall positive influence on society. One such way was through the development of economic circumstances in the community. They further argued that these circumstances are necessary for a company to be considered a HVM company. The literature on societal and economic benefits is also incomplete and cannot be completely trusted as most of these cases involve short term benefits.

### **2.2.5.3. Environmental Benefits**

Environmental sustainability has also been researched and connected to high value manufacturing as one of the key benefits. Some researchers have been vague but have commented on the potential for manufacturing to play a key role in trying to eliminate the negative effect on the environment (Martinez et al., 2008). More specifically, Livesey (2006) points out that high value manufacturers have strong environmental performance and concentrate on being environmentally responsible. Further development of this reveals that a trend in manufacturing with products of high value is utilizing fewer resources such as reducing water and energy usage and instead relying on renewable sources and extending the product life cycle (University of Cambridge, 2016). Companies of the HVM industry have development that is sustainable and they try and utilize natural resources and eliminate waste (Livesey, 2006). In this way, they are implementing lean manufacturing to reduce waste. There is limited research on the environmental benefits of HVM, but the shift to using HVM has been one to try and minimize the environmental impact. Longitudinal studies on

the use of HVM and reduction of the environmental impact must be researched in order to confirm these benefits.

### **2.3. European Union Policy**

European Union (EU) policy focuses on policies and laws pertaining to the European Union. The one that will be of focus is the policies regarding manufacturing and more specifically any policies on high value manufacturing in Europe. The policies are important to understand and discuss as they pertain to the potential investment into high value manufacturing and the usage of it as a strategic approach.

#### **2.3.1. EU Industrial Policy**

The economic crisis of 2008 has increased the desires of the EU to improve the industrial policies. In particular, the policies include a greater focus on framework and innovative measures (Stöllinger et al., 2013). The main actions in the policy include normalizing competitiveness in the industrial sector, increasing the support for innovation in the sector, and increasing investment in the industrial sector through greater access to energy and raw resources and lastly, supporting EU firms with their integration into global value chains (Industrial policy, 2017). Previous research has concentrated on trying to characterize manufacturing and making sure it reflects the new external factors such as globalization. It is crucial to modernize what encompasses manufacturing, and add more understanding to the transfer of knowledge that occurs in the overall product life cycle and the different stages of the value chain. These will help policy makers understand what areas are crucial and need further development to increase production efficiency (O' Sullivan, 2011). Government policy has also tried to capitalize on sustainable competitiveness through the use of taxes and regulations including regulations on new types of technologies in the industrial sector (University of Cambridge, 2016). Furthermore, the new EU industrial policy focuses on limiting environmental impact and climate change. New technologies in the manufacturing sector are wanted to improve the sector, specifically new markets

of high value manufacturing (Stöllinger et al., 2013). The EU Industrial policy has been changing trying to reflect the impact of globalization on the manufacturing sector and policy makers have been keen on increasing innovation in the sector.

### **2.3.2. EU Industrial Policy and High Value Manufacturing**

It is important to reflect on the impact that the EU industrial policy has on the implementation of HVM in Europe. The development of change in EU policy, previously, had been very slow as much of the drastic change occurring in manufacturing had not reflected onto new industrial policies (Bryson et al., 2008). However, in recent years HVM has been prevalent in UK policy; new enterprises such as the High Value Manufacturing Catapult, created in 2011, are used to regenerate the manufacturing sector. Their goal is towards creating growth and adding value to the overall GDP through governmental investments (Walendowski and Rivera León, 2014). The HVM Catapult initiatives include establishing collaboration in Research and Development through partnerships and joining EU associations in order to receive governmental funding to expand their reach and help more companies wanting to diversify (United Kingdom: HVM Catapult, 2015). In the overall region of Europe, Walendowski and Rivera León (2014) found four main initiatives in regards to expanding high value manufacturing. These include using raw materials efficiently and sustainably, having new resources that are particular to advanced manufacturing processes, and focusing on increasing the ability to be innovative and competitive in the industry through the use of new advanced equipment to increase automation. There is limited research on the impact of the industrial policy on high value manufacturing due to the novelty of both the manufacturing approach and the policies. However, the literature shows that there is more focus on advancing the manufacturing sector by investing in new technologies and equipment.

## **2.4. Sectors Utilizing HVM**

The popularity of high value manufacturing has increased in recent years, and as stated in the previous sections different types of sectors are capable of using HVM. More specifically, companies in these sectors can make the shift to high value manufacturing by advancing their manufacturing processes and expanding their innovative capabilities, which will result in the increase of value creation. Literature on sectors shifting to HVM has been researched with case studies of company's shifting as examples. However, because this is a new concept and way of manufacturing, there is limited research on the matter. Therefore, only an overview of sectors can be given and most of the focus will be on particular examples.

Manufacturers of niche products have been exposed to global competition and have had to compete in ways other than price. Manufacturers of locks in the United Kingdom, are one example of niche products that are facing competition of developing countries creating low cost, high volume products. The niche product sector utilized the idea of high value manufacturing and created products that were high in customization and that directly targeted a specific consumer market (Bryson et al., 2008). Another sector of companies comprises SMEs or small and medium sized enterprises in developed countries. The research was specifically on SMEs in Scotland and they found these companies were shifting towards design and service types of activity focusing on service packages that complemented the production processes (MacBryde et al., 2013). Clothing sectors have also started shifting towards high value added through the development of technical clothing products. One case examines the development of high value creation in the Beta-Clothing firm. The researchers suggested that in order for clothing firms to diversify into high value clothing they must grow their capacities in information gathering to maintain knowledge of possible opportunities through interaction with other companies. Furthermore, they must continuously develop and operationalize the knowledge gathered within the organization (Theodorakopoulos, McGowan, Bennett, Kakabadse, and Figueira, 2014). The Life Sciences sector in the United Kingdom has also begun utilizing high value manufacturing to produce high value added products. This sector has focused on customizing the products to fit customers' needs and using knowledge-based

techniques to expand the point of delivery capabilities (Dunkerton and Bustard, 2013). The concept of servitization in HVM has also been utilized by Rolls-Royce Aerospace. Rolls-Royce has shifted from selling aero engines to creating inclusive packages with the main idea being “power by the hour”. This means that the airlines do not pay a major price for the aero engines, rather pay for the hours they fly and thus only pay for the power they use. Rolls-Royce is responsible for any risks and all maintenance of the engines, and generates revenue through the availability of their engines (Neely, 2008).

A number of sectors have started to utilize the approaches under the HVM umbrella. These examples represent different sectors that have moved away from being competitive with price and found another way to differentiate themselves from other companies. The literature highlights the many different ways that this can be done through the use of high value manufacturing. This only includes a limited number of different sectors that have been researched and their shift analyzed, which means there is a possibility that other sectors can make the shift and in the future others will be researched.

## **2.5. High Value Manufacturing as a Strategic Approach**

High value manufacturing can be potentially used as a strategic approach in order to maintain profitability and gain a competitive advantage in a particular industry. Companies need to be continuously innovative and alert to changes to remain sustainably competitive. At this time, manufacturing is being offshored to developing countries that are keen on keeping costs low and producing an extensive volume of products; in order to bring back the manufacturing to Europe there must be extra value created to compete with low cost. The shift to high value added manufacturing can be one approach as it focuses on value creation to all stakeholders with proficiency in advanced ways of manufacturing. Information on HVM as a strategic approach is scarce as policymakers and manufacturers are slowly starting to realize its potential and thus this section includes only a few case examples of companies that have made the shift and benefitted from it.



Researchers have investigated the essential aspects that need to be in place to ensure competitive advantage and found them to be innovating products using quick response, focusing on customer-based solutions and using brand leadership strategy (MacBryde et al., 2013). Research conducted by Bititci et al. (2010) found similar results with their case study on Highland Spring. They used the HVM model to establish a brand leadership strategy as a way of value creation and translated production costs to other activities. The niche manufacturers of locks found that by using efficient high value added processes such as product customization and directly focusing on producing a specific amount to fulfill the needs of the customers created a competitive advantage for them (Bryson et al., 2008). The strategic approach of HVM can be translated into the clothing manufacturers as it acknowledges the operating environment challenge, supports strategy in technology and reinforces entrepreneurial opportunities to reestablish the competitive advantage (Theodorakopoulos et al., 2014). In the Life Sciences sector, HVM has been significant in getting products to market and furthermore enriching GDP and the country's wealth (Dunkerton and Bustard, 2013).

Overall, the literature highlights the many different approaches of high value manufacturing that can be taken as part of one's strategy to maintain a competitiveness that is sustainable in the global value chain. More research can be done to increase the credibility of the findings and help generalize this approach to different sectors and companies. Additionally, long term research will help understand the long-term effects of the HVM approach on one's competitive advantage and sustainability.

## **2.6. High Value Manufacturing Checklist**

The literature review discussed the many approaches of high value manufacturing. The following checklist showcases the main HVM approaches. This checklist will be utilized to examine the high value manufacturing approaches used by the HVM companies.

1. Customer-based solutions (MacBryde et al., 2013; Livesey, 2006)
2. Brand leadership strategy (Bititci et al., 2010; MacBryde et al., 2013)

3. Short lead time and fast delivery times (Livesey, 2006)
4. 'Just in time' manufacturing (Bryson et al., 2013)
5. Servitization (MacBryde et al., 2013; Neely, 2008)
6. Innovative design (Martinez et al., 2008)
7. Ownership of entire product life cycle with additional services (Yang et al., 2013; MacBryde et al., 2013; Livesey, 2006)
8. Satisfy customers' needs with entire product/service range (MacBryde et al., 2013)
9. Coordinated communication in entire manufacturing process (Chen, 2000)
10. Increase in resource and material efficiency (O'Sullivan, 2011; University of Cambridge, 2016)
11. Increase in automation (Bryson et al., 2013).
12. Extending product life cycle through recycling (Martinez et al., 2008)
13. Using Lean manufacturing, systematic way of reducing waste (Livesey, 2006; Pearce and Pons 2013)

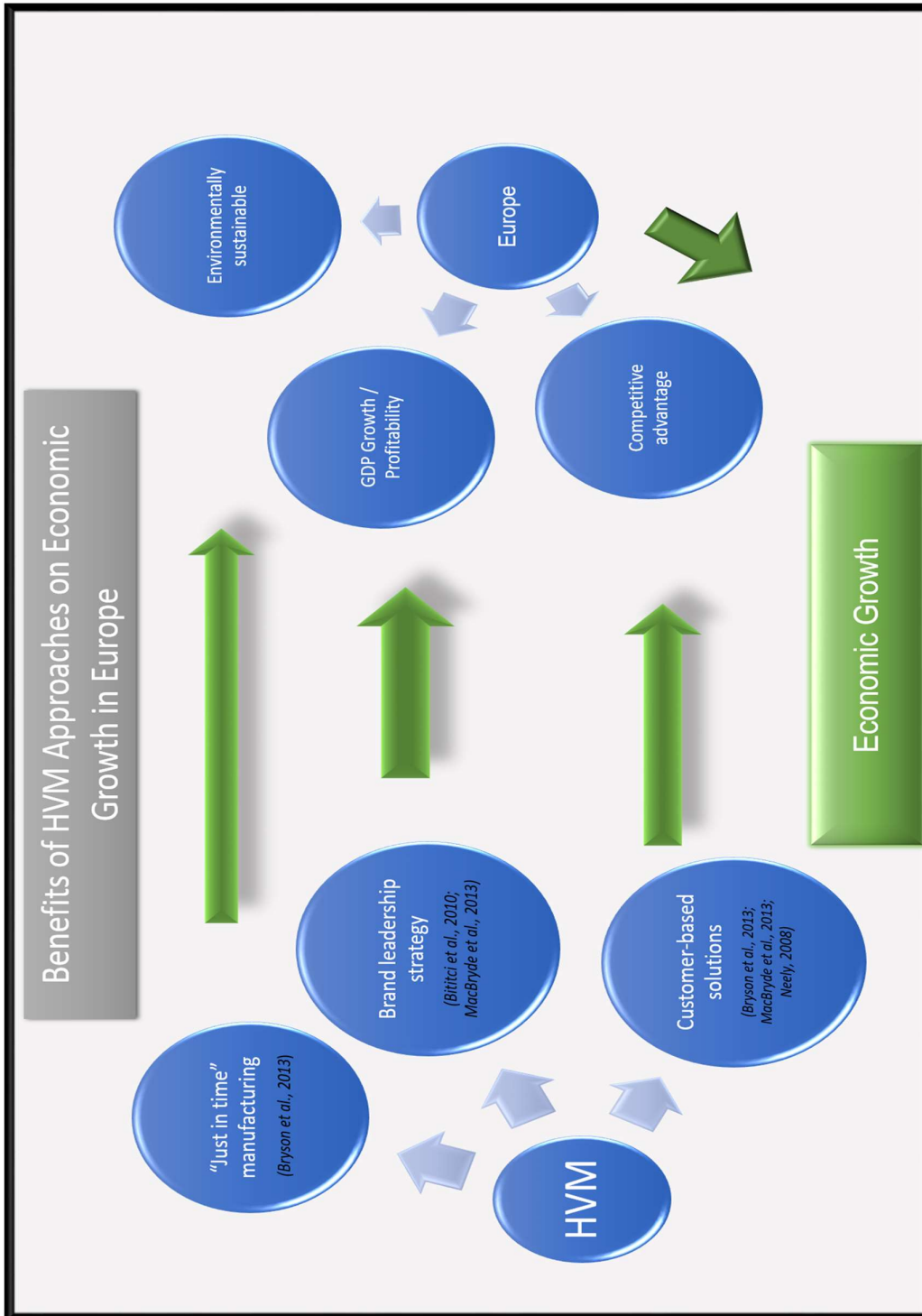
## 2.7. Conceptual Framework

The purpose of the conceptual framework is to illustrate the strategic benefits of high value manufacturing that can potentially be used as a strategic approach in Europe to bring back manufacturing lost to developing countries. The framework in Figure 2 outlines the two important factors related to the topic of HVM and Europe. The two are separated to highlight specific approaches that HVM utilizes to create the benefits that are needed for Europe to ensure economic growth in the future. The three circles surrounding the HVM circle represent different types of manufacturing processes that have high value and create value for stakeholders. The three circles surrounding the Europe circle represent attributes that if improved or benefitted upon can help create economic growth. HVM utilizes the idea of servitization to create customer-based solutions (MacBryde et al., 2013). Servitization focuses on satisfying customer needs by selling a product as a solution with focus on customer service and support packages (Neely, 2008). These companies rely on customization and focus on specific consumer target markets to fulfill the needs of the customers (Bryson et al., 2013; MacBryde et al., 2013). The framework shows an arrow coming out of the customer-based solutions circle and it is pointing towards the competitive advantage circle. This is because companies who have customized products create innovative customer service and quick customer reaction speeds which helps them differentiate themselves from their competitors and thus create a competitive advantage (MacBryde et al., 2013). Furthermore, when companies shift to manufacturing with high value creation they can utilize the brand leadership approach. The brand leadership strategy helps to guide operative and tactical decisions in the manufacturing process (Bititci et al., 2010). The brand leadership circle has an arrow pointing to the increase in GDP and profitability circle because it is another approach to create value through the decrease of production costs (Bititci et al., 2010; MacBryde et al., 2013). High brand recognition or emotional attachments to certain brand elements create sustainable profitability and a successful company leads to an increase in the country's GDP. The last strategic approach of HVM that becomes a benefit is 'just in time' manufacturing. This approach reduces inventory costs by only producing what customers' need (Bryson et al., 2013). An arrow is pointing to the environmentally sustainable arrow because this strategy is environmentally friendly since it utilizes fewer raw materials and resources and only

produces what is needed to help reduce waste. The framework shows the correlation between high value manufacturing processes and the desired attributes of Europe. HVM processes benefit the European attributes which then leads to Economic Growth for Europe. In other words, the Economic Growth square is in between HVM and Europe because the use of the strategic approaches of HVM results in benefits in Europe which results in overall economic growth.

The following research will utilize the framework and the benefits derived from HVM as seen in the conceptual framework in examining HVM companies. This will help determine whether these benefits are in fact plausible for companies considering the shift to HVM and whether this strategic approach might bring back the sustainability of the manufacturing sector in Europe and create economic growth.

Figure 2: Conceptual Framework



### **3. METHODOLOGY**

The secondary data collection or the research on the literature was utilized to identify theories that formed the conceptual framework. This means that the overall approach for this research is to use the deductive approach. This is because a conceptual framework was developed and the primary data will be collected in order to test the framework (Saunders, Lewis, and Thornhill, 2009).

Primary data collection is necessary for this research due to the limited number of secondary sources on this topic. The primary data will further develop and confirm the information on the benefits of high value manufacturing discussed in the literature review. Furthermore, the primary data will focus on companies who are utilizing high value manufacturing in order to understand the main benefits of HVM and its viability as a strategic approach for companies.

The purpose of this section is to analysis the different methodologies and data collection methods that are appropriate for this type of study. This section will include a discussion of how and why the specific research approach and data collection method were chosen.

#### **3.1. Analysis of Research Approaches**

To determine the most appropriate research approach for the study it is important to consider the several alternatives that can be used. Identifying and analyzing each alternative will result in the discover of the most fitting approach.

The first step is to determine the most useful research method between the quantitative and qualitative research methods. These are the main methods used in business research to determine how and why certain things occur (Cooper and Schindler, 2014). The qualitative research method focuses on a variety of explanatory procedures on naturally occurring phenomenon with the aim to decode and find meaning. This drastically differs from the quantitative research method which tries to find a precise

measurement of a particular thing through the use of opinions and behaviors. One of the main differences between the two is that qualitative research attempts to establish theory while quantitative research focuses on testing theory (Cooper and Schindler, 2014). Furthermore, numerical data is collected with the quantitative method while the collected qualitative data is not standard and thus the data must be categorized into specific themes (Saunders, Lewis, and Thornhill, 2009). The most appropriate research method for the current study is the qualitative research method. This is because the current research is concentrated on gathering data to understand the phenomenon of high value manufacturing and build on the theory of HVM being utilized as a strategic approach for companies. This study must use interpretative research to help develop an understanding of the main benefits of high value manufacturing that can potentially create economic growth in Europe. The next step is to assess qualitative research methods to determine the most suitable method for data collection.

The qualitative research method has many different types of data collection methods. These include, "focus groups, individual depth interviews (IDIs), case studies, ethnography, grounded theory, action research, and observation," (Cooper and Schindler, 2014). All of these data collection methods have the same goal of attaining a proper understanding of a certain idea and thus can be used for this type of study. However, there are several implications that must be considered to understand which method is the most plausible. There is a limited time frame to conduct the research and thus several of the methods such as focus groups, case studies, ethnography, and observation are tasks that require a major time commitment and are suitable for long-term research. This means that they would not reach a complete and satisfactory level if conducted here. Furthermore, this particular research on HVM focuses on companies who are considered high value manufacturers. The information to be collected must focus on company information and the opinions of the participants. This means that observation and ethnography will not result in meaningful information that is relevant to this research. This is due to the fact that these two focus more on observing individuals in a specific culture or environment. Lastly, the idea of high value manufacturing as a strategic approach is fairly new and has not been extensively researched thus it is not possible to generate a theory from this research. Therefore, grounded theory is not a plausible data collection method for this study. Overall, the

most feasible and logical data collection method for this study on high value manufacturing is individual depth interviews. The use of interviews will generate data that is relevant and beneficial for the study and this data collection method does not have any major limitations.

The next step in the analysis of research methods is to identify the type of individual depth interview to conduct with the organizations. The main types of interviews are face-to-face, video call, and telephone interviews. Although most interviews are conducted face-to-face, telephone interviews provide several advantages in relation to accessibility, speed, and cost efficiency (Saunders, Lewis, and Thornhill, 2009). The research focuses on companies located in Finland. Geographically these companies are spread around Finland and thus telephone interviews are the most logistically practicable. As it would be costly and time consuming to travel around Finland and conduct face-to-face interviews. Furthermore, the interviewees agreed to a maximum of 30 minute interviews and so the telephone interview allowed for feedback and organic conversation but in a time efficient manner. It was determined that video calls would take longer to set up and thus they were deemed inefficient and unnecessary for this study. With telephone interviews, the ability to report on any non-verbal behaviors of the participant is not possible, however, it is not necessary for this study. This is because the research is not focused on the behaviors or opinions of individuals and the addition of non-verbal cues will not bring value to the study.

The last part of the data collection analysis is to determine what type of interview should be used. The interviews can be characterized into three specific types: structured interviews, semi-structured interviews, and unstructured or in-depth interviews (Saunders, Lewis, and Thornhill, 2009). For this study, the use of semi-structured interviews allows the interview to have a basic structure but it also creates organic conversation and questions. Therefore, additional sub questions and elaborations can be asked from the participants. Furthermore, the semi-structured aspect allows for a list of questions that will be asked by all the interviewees. With this the answers from the participants can be compared side by side. Overall, the analysis of the possible research approaches uncovered that qualitative semi-structured interviews is the most appropriate data collection method for this research on high value manufacturing.



## **3.2. Data Collection Method Analysis**

The purpose of this section of the methodology is to discuss the process of collecting the primary data for this study.

### **3.2.1. High Value Manufacturing Company Interviews**

This research required interviews with high value manufacturing companies in order to determine types of manufacturing process changes to high value and the benefits of these changes. The information collected will help to understand the benefits of high value manufacturing for a company's strategy.

Companies located in Finland who had the credentials of a high value manufacturing company were found online and a total of thirteen HVM companies were contacted, of which seven replied. However, only four of the seven agreed to a telephone interview. All four interviews were conducted in March of 2017. A crib sheet of questions (Appendix 1) was created prior to the interviews to follow the requirements of a semi-structured interview. However, participants were asked additional sub questions and in some cases to further elaborate certain answers in order to gain a deeper understanding of the subject. At the beginning of each interview, the participants were told the purpose of the interview and research. The answers were written down during the interview. At the end of the interview, each participant was asked permission to use their name and the company name. Two of the participants did not give permission and wished to remain anonymous. The interviews averaged 30-40 minutes. The interviewees were not given any sort of compensation for their participation.

The chart below displays details about each participant. To protect the confidentiality of the two participants and the companies they will be listed as "Anonymous 1" and "Anonymous 2" for the table boxes listed participant name and company name.

### Basic Information of HVM Interviewees

<b>Participant Name</b>	<b>Title</b>	<b>Company Name</b>	<b>Company Description</b>
Olli Heinonen	CEO	UTU	Manufacturers of switchboards for the electricity industry
Anonymous 1	Head of Factory	Anonymous 1	Manufacturers of hydraulic systems designs and cylinders for the engineering industry
Anonymous 2	Head of Factory	Anonymous 2	Manufacturers of electronic measurement systems for industrial applications
Timo Rouvinen	Executive- Helsinki Operations	GE Healthcare Finland	Manufacturers of patient monitoring solutions for the healthcare industry

## **4. FINDINGS**

The purpose of this section is to present the findings of the primary data. The interviews were conducted with high value manufacturing companies and the participants were introduced in the previous section. This section will present the responses from the interviews.

### **4.1. Improvements of Manufacturing Operations**

The semi-structured interviews with participants who have adopted high value manufacturing into their companies gave a proper understanding of the manufacturing for each company. Furthermore, the interviews gave a clear understanding of the improvements that have been made by the companies to increase their value creation.

During the interviews, it was found that the majority of the manufacturing for each company was located in Finland and Europe with the exception of one company. Olli Heinonen from UTU stated that 100 percent of their manufacturing was located in Finland. Whereas Rouvinen said that only 30 to 40 percent of production for the patient monitor solutions is in Finland, but their goal is to move new production business to Finland. With the interview responses, it can be concluded that manufacturing improvements have been made to keep the manufacturing sustainable in Finland.

The participants were asked about two important improvements that have been made in their manufacturing processes and although the responses showed that each company had focused on a different area to improve it can be concluded that the main focus for each company was to increase the level of efficiency and value creation. Olli Heinonen of UTU commented that their production method has improved in terms of the assembly of the product on an employee level. They have reduced the number of employees by increasing the responsibilities of one employee to be able to assemble one product through the entire manufacturing process. Another improvement that Heinonen mentioned related to the logistics and layout of the UTU factory located in the city of Pori, Finland. The other interviewees did not mention any specific changes

in the layout of the factory as major improvements. However, Heinonen noted that the procurement of materials, logistics in the factory and flow of the materials have improved alongside the change in the production philosophy of the individual employee. Less specifically, Anonymous 1 noted that there have been many improvements in the design process, delivery performances and overall, they have better technological know-how. Anonymous 2 noted focus on lean manufacturing thus eliminating waste in the manufacturing process. Furthermore, the participant commented about the process development in the supply chain and concluded that with lean manufacturing there has been continuous development in the reduction of lead time. GE Healthcare Finland also noted to the use of the lean philosophy with Rouvinen mentioning major improvements in waste elimination and the removal of additional processes, steps, and sources that wasted time. These have resulted in cycle and lead time reduction. Particularly they have established a one-piece flow that eliminates any unnecessary steps allowing for a smooth transformation from order to the product being shipped. This improvement in their manufacturing has allowed them to easily spot and fix any quality issues during the process thus eliminating the need to test the batch and do extra rework. Another improvement in management that was mentioned was in the management culture. GE Healthcare Finland has particularly improved the horizontal orientation collaboration needed to operate in the complex environment. Specifically, they have established an open office environment that facilitates communication with the right stakeholders.

#### **4.2. Position as High Value Manufacturers**

The position of the companies as high value manufacturers was also discussed in the interviews. The participants were first asked whether they could position themselves as high value manufacturers. This position was later confirmed with the HVM checklist. Anonymous 2 from the electronic measurement systems company acknowledged that as a company they are creating preferences, collaboration and cooperation that ensures accurate measurements and thus concluded that they are a high value manufacturing company. With UTU, Heinonen noted that producing a commodity product means that the product cannot be considered one of high value but the high

value design, customization, and a fast delivery schedule creates the high value. Anonymous 1 from the hydraulic systems design and cylinder manufacturing company concluded that they are producing a high-end product and have customer service options throughout the process to the end product. Rouvinen also noted that GE Healthcare Finland is a HVM company because they create ‘smart devices’ and add value to the products. He specified that their patient monitor offers several measurement modes to customers using software solutions that require less data from the patients.

The following table visually displays the position of each company as a HVM manufacturer. This table summarizes the HVM approaches used by the HVM companies. A symbol will be placed in each box to express whether the approach is utilized by the companies. A simple tick mark in the box means the approach is fully used by the company, a x-cross mark means the approach is not used by the company and lastly a tilde mark means the approach is sort of used by the company.

#### **Positon as High Value Manufacturers**

	<i>UTU</i>	<i>Anonymous 1</i>	<i>Anonymous 2</i>	<i>GE Healthcare Finland</i>
<b>Customer-based solutions</b>	✓	✓	✓	✓
<b>Brand Leadership Strategy</b>	x	x	x	x
<b>Short lead time/ fast delivery time</b>	✓	✓	✓	✓
<b>‘Just in time’ manufacturing</b>	✓	~	✓	✓
<b>Servitization</b>	x	x	x	~
<b>Innovative design</b>	~	✓	✓	✓
<b>Ownership of Product Life Cycle/ Services Added</b>	~	✓	✓	✓

<b>Satisfy Customer Needs with Entire Range of Products</b>	✓	✓	✓	✓
<b>Coordinated communication</b>	✓	✓	✓	✓
<b>Resource and Material Efficiency</b>	✓	✓	~	✓
<b>Automation</b>	x	~	~	✓
<b>Recycling</b>	✓	✓	~	✓
<b>Lean Manufacturing</b>	✓	~	✓	✓

#### **4.2.1. Usage of Customer-Based Solutions**

During the interviews, the participants did focus on similar HVM areas. For instance, the idea of customer-based solutions was brought up repeatedly in each interview with customization being an important focus for the companies. Each company provided customized features to meet the specific needs of their customers. However, Heinonen also added that UTU has several standard products alongside their customized projects. In regards to their product range, all participants stated that they offer a wide product range to satisfy the needs of their customers. Furthermore, all participants agreed that they aim to be competitive in other ways than cost. All four participants said their customization and quality are key ways they stay competitive. Heinonen and Anonymous 2 mentioned that their products are more expensive than their competitors. With regards to design, Rouvinen, Anonymous 1 and Anonymous 2 mentioned having an innovative design process with greater speed and intelligence.

#### **4.2.2. Usage of Just in Time Manufacturing**

Another important focus that was discussed in the interviews was delivery time efficiency and 'just in time' manufacturing. Rouvinen said that GE Healthcare Finland

uses the 'just in time' manufacturing model and aims to have the materials from suppliers arrive right before they are needed to make the product, further noting that this has helped eliminate unnecessary inventory. Heinonen and Anonymous 2 noted that most of their products are manufactured to order which has reduced lead time and increased delivery on time, with Heinonen furthermore emphasizing that with less employees they can still get the products done on time. Anonymous 1 said that they mostly focus on producing products to order but have a small inventory of specific products that they can give to new customers right away. It was also noted that delivery punctuality and the precision of products was accurate for their company. Reliability for UTU was another key issue discussed in the interview. Heinonen commented on the importance of being a reliable supplier for customers. Further mentioning that competitors who manufactured in Eastern Europe had difficulties in logistical delivery and manufacturing outside of Finland would lead to time and cost difficulties. He concluded that because the focus is the Finnish market it makes sense to manufacture in Finland.

#### **4.2.3. Usage of Resources and Materials Efficiently**

The companies also discussed their focus on resource and material efficiency and their position as an environmental friendly company in the interviews. Heinonen and Anonymous 1 noted a focus on recycling metal and other scraps. Anonymous 2 noted that the environment is an important focus for sustainability but that the company currently has very little recycling for their products. Rouvinen mentioned a key focus in recycling to extend the product life cycle and new solutions to reduce electricity consumption. The use of servitization was also discussed in the interviews. Heinonen, Anonymous 1, and Anonymous 2 noted that servitization is currently not part of their business model. Anonymous 2 did mention that servitization has been in discussion for a possible next step, but stated that the customers are not ready for this change. However, Rouvinen noted that a new option to only pay for the hours using the product is currently being introduced to their products. The companies were also asked whether they provide additional services. It was found that GE Healthcare Finland, Anonymous 1, and Anonymous 2 have extended their ownership of the product life

cycle with additional support and maintenance services for the consumers. For instance, Anonymous 2 noted that their governmental customers expect extra services including installation and project management. Similarly, Rouvinen noted that GE Healthcare Finland offers affordable life time management solutions for their customers. While Heinonen stated that UTU offers very little additional support or maintenance services for their products. He further commented that UTU mainly focuses on the delivery of the product for the low voltage switchboards but for the medium voltage switch gears they do provide installation.

#### **4.2.4.Differences in Position as High Value Manufacturers**

Although similarities in HVM focus areas for the companies were found different focus areas were also uncovered. This was particularly the case when discussing the use of automation. For instance, Rouvinen noted that automation is a major focus area for them. Currently, they have developed collaborating robots that work alongside the operators. These robots have improved accuracy and quality, eliminated waste and further established the one-piece flow. This has further allowed them to remain competitive and profitable. While the focus on automation was not the case for UTU, with Heinonen saying that the reduction of employee numbers did not result from an increase in automation. Anonymous 1 and Anonymous 2 mentioned an increase in automation, but noted its use to be fairly limited in their companies. The question of high brand recognition also resulted in differing opinions. Heinonen mentioned having a better brand than local competitors but noted that the brands of their major competitors, ABB and Siemens were stronger. Anonymous 2 noted their company to have different levels of brand recognition in their different business areas but further stated that they do not use their brand to sell the product. However, high brand recognition was not specifically mentioned by Anonymous 1 and Rouvinen.



### **4.3. Perceived Benefits of High Value Manufacturing Implementation**

The interviews with the HVM companies also provided in-depth information about the benefits from the implementation of the improvement projects and manufacturing with high value added. Furthermore, there was insightful discussion on the value creation occurring in the companies. Lastly, the interviews concluded with a question regarding the overall future of manufacturing for each company.

When asked about the main short and long term benefits of improvement projects and high value implementation the interviewees gave a multitude of answers. One common benefit that was mentioned by all the participants was that they have been able to remain competitive in their industry and create a sustainable competitive advantage. Rouvinen expanded on this concept by describing price erosion and how the company needs to sell more products in order to get the same revenues as the previous year and remain competitive. Rouvinen and Heinonen also mentioned savings in production costs, with Rouvinen confirming that production costs have reduced 10 percent every year for GE Healthcare Finland and this year they are aiming to reduce costs by 12 percent. Heinonen noted the decrease of production costs in terms of material procurement and the reduction of employee numbers. Prior to these improvements, they purchased unnecessary materials that remained unused thus they have been able to reduce material waste. Furthermore, with less employees they are still able to efficiently complete products and deliver them on time. He also noted that one short term benefit of these improved approaches has been an increase in profitability for the company. Anonymous 2 found that with lean manufacturing their efficiency has improved meaning they are able to handle increasing volumes while using the same amount of resources. The participant further added that the increased volumes have led to increased sales and thus a greater profit margin and growth. Anonymous 1 also referred to an increase in profit margin for their company and found that the extension of product ownership thus the addition of extra services has increased the value creation to customers. Customer satisfaction was also noted by the participants. Rouvinen noted that this type of manufacturing is customer focused. The company is able to be flexible and react fast to satisfy the needs of the customers. With UTU, Heinonen mentioned that one long term benefit of the delivery time improvements is

being a reliable supplier to their customers which differentiates them from their competitors. Heinonen also mentioned an increase in employee satisfaction as now the employees have access to all the materials they need and can do their job well. Value creation to multiple stakeholders was also discussed with the interviewees. All the participants mentioned creating value to customers with their product performance. Rouvinen further noted that the end customers are their most important stakeholder and by providing innovative solutions they add value to customers and support lives. Heinonen mentioned value creation to employees and the economy. The factory is located in Pori and is a big employer providing jobs for around 100 people which provides tax money and employment for the region.

Lastly, the participants were asked about the future for their company's manufacturing. Heinonen mentioned a greater focus on production projects and adding value through design work. Furthermore, he mentioned future improvements in flexibility which will help predict demand and allow them to adjust resource amount. Rouvinen discussed continuous improvement in supply chain management and he saw growth in the healthcare market particularly the mobile digital health industry. Anonymous 1 mentioned continuing to produce high end products and the possibility of adding servitization to their business model in the future. Lastly, Anonymous 2 discussed future collaborations with other countries and increasing market presence in major markets. Furthermore, this participant added that the company must focus more on the significance of big data and communication within the supply chain management.

## **5. DISCUSSION & ANALYSIS**

The purpose of this section is to discuss and analyze the findings of the research. The findings will be compared to the information disclosed in the literature review and similarities and differences will be uncovered. Firstly, it can be concluded that the interview findings showcased companies that have adopted high value manufacturing approaches. Overall, the findings supported information stated in the previous literature on high value added manufacturing. Particularly the research findings confirmed benefits or the value creation of high value manufacturing that were discussed in the literature review. These include internal benefits for the company and external benefits for society and the environment. Furthermore, it highlighted different sectors and industries that are utilizing HVM processes as a strategic approach. This discussion will also include the important differences that were discovered between the findings and the literature.

### **5.1. Profit and Value Creation Benefits**

The profit and value creation benefits of high value manufacturing were key benefits discussed in the review of the literature on HVM. These were further confirmed in the findings of the interviews.

One of the main benefits of HVM that was discussed was the reduction of production costs. High value manufacturing eliminates the use of the stock strategy and thus the manufacturing of products is solely based on customer orders. More specifically this leads to a major decrease in inventory costs and thus the overall production costs (Bryson et al., 2013). This benefits the company's profitability as this shifts the value to the output. This HVM benefit was discussed in the conceptual framework as one process change to create sustainable manufacturing and potentially economic growth in Europe and was further confirmed in the research findings. All four interviewees noted on mostly focusing on manufacturing to order and eliminating the use of inventory. Furthermore, they concluded that the high value approaches have increased their delivery performance in terms of short lead time and overall delivery schedule

(Heinonen, 2017; Rouvinen, 2017; Anonymous 1, 2017; Anonymous 2, 2017). During the interviews, both Rouvinen (2017) and Heinonen (2017) discussed savings in production costs with the use of these HVM approaches. Rouvinen (2017) noted that GE Healthcare uses the 'just in time' manufacturing model and also aims to eliminate any unnecessary inventory of supplier materials waiting to be used. This model has resulted in a 10 percent decrease of production costs every year. Heinonen (2017) also noted reductions in terms of material procurement. Before the manufacturing improvements, UTU purchased an unnecessary amount of material that was left unused. With the logistical improvements, they have reduced material waste and saved on material costs. Another benefit discussed in the literature on manufacturing with high value was improvement in efficiency and the turnover ratio (Bititci et al., 2010). More specifically, the literature noted that lean implementation in high value manufacturing increases efficiency in the production (Pierce and Pons, 2013). Anonymous 2 (2017) noted that lean manufacturing or eliminating waste has improved their efficiency and has allowed them to use the same amount of resources for greater product volumes. Heinonen (2017) also discussed that improvements in logistics and material flow have increased the efficiency of their production. Furthermore, he mentioned that with less employee numbers they are still efficiently producing the products and delivering them on time. With the use of high value manufacturing approaches GE Healthcare Finland has created a one-piece flow that has removed pointless steps allowing for a more efficient production of products from start to finish (Rouvinen, 2017). The academic literature also mentioned an overall increase of profitability as a benefit of high value manufacturing (Livesey, 2006; Bititci et al., 2010; Bryson et al., 2013). Anonymous 1 (2017) concluded that the company has experienced an increase in profit with improvements in technological know-how. Anonymous 2 (2017) noted that with HVM and more specifically lean implementation they have been able to handle an increase in production volumes which has resulted in an increase in profitability and thus overall growth as well. The literature more precisely found that the high value manufacturing approaches include technological advances that increase automation and reduce employee numbers resulting in profit margin growth (Bryson et al., 2013). Heinonen (2017) confirmed that UTU has been able to reduce employee numbers and costs by efficiently increasing responsibilities of the employees but not decreasing their production capabilities. This reduction has

decreased expenses and he noted that this has led to an increase in profitability. GE Healthcare Finland has increased focus on automation with Rouvinen (2017) commenting that their robots have improved accuracy and quality as they can assemble very small components. Furthermore, this increase in automation has reduced waste and allowed them to remain profitable. Another significant internal benefit for the company confirmed in the research findings was customer approval (Bititci et al., 2010). Heinonen (2017) found that with the fast delivery time schedule and high delivery accuracy they have seen an increase in customer satisfaction. He later added a long-term benefit with these approaches is being a reliable supplier for their customers. Rouvinen (2017) noted that their manufacturing with high value allows them to be customer focused. Anonymous 2 (2017) also mentioned that a long-term benefit of their lean manufacturing implementation is customer satisfaction, as this satisfaction has resulted from delivery of the product on time and the quality improvements. The literature also found that knowledge-based synergies found in high value manufacturing increases the market value of the products (Yang et al., 2013). This was also seen in the interviews as Heinonen (2017) and Anonymous 2 determined that their production methods and approaches allow them to be more expensive than their competitors and still be profitable. Another important benefit of high value manufacturing is the creation of a competitive advantage. The literature concluded that HVM satisfies consumer needs which helps establish a sustainable competitive advantage (Yang et al., 2013; MacBryde et al., 2013; Bryson et al., 2008; Theodorakopoulos et al., 2014). With MacBryde et al. (2013) and Bryson et al. (2008) mentioning that customer-based solutions is a key aspect in ensuring a competitive advantage and differentiation from competitors. The conceptual framework further demonstrated the relationship between customer-based solutions and the desired attribute of a competitive advantage. Furthermore, the relationship discussed in the conceptual framework was confirmed in the research findings as all four participants mentioned customization as a key factor in staying competitive in their industry (Heinonen, 2017; Anonymous 1, 2017; Anonymous 2, 2017; Rouvinen, 2017). Rouvinen (2017) mentioned that even with price erosion they have been able to be competitive because they are flexible and are able to react fast to meet the needs of the customers. It can be determined that customization is a key part in being competitive because all of the companies have utilized customized features to remain

competitive in the industry. Furthermore, the findings show that customers are demanding more custom features and that standardized products are no longer desired as much. Value creation benefits discussed in the literature were also confirmed in the research findings. The literature found that high value manufacturing creates value to several stakeholders (Martinez et al., 2008). This was also acknowledged in the research findings. All of the participants mentioned benefits in value creation to customers with improved product performance (Heinonen, 2017; Rouvinen, 2017; Anonymous 1, 2017; Anonymous 2, 2017). Rouvinen (2017) discussed the importance of the end customer and how they have been able to create value with their innovative solutions. Anonymous 1 (2017) further noted that the extension of their product ownership with the addition of extra services has increased the value they create to their customers.

There were however discrepancies in the literature and the research findings. The academic literature did not include a discussion on employee satisfaction being a benefit of high value added manufacturing. However, during the interviews, Heinonen (2017) noted that employee satisfaction had increased with the implementation of these new approaches. This is because the employees have better accessibility to the materials they need and thus have the capabilities to complete their job well. He also mentioned the production based bonuses that were in place and concluded employee satisfaction as both a short and long-term benefit.

## **5.2. Economic and Environmental Benefits**

Value creation benefits with regards to the economy and the environment that were discussed in the literature were also supported in the research findings. However, there were certain benefits mentioned in the literature that were not found in the research findings. The literature found that high value manufacturing companies significantly benefitted a country's economy in terms of wealth (Livesey, 2006; Dunkerton and Bustard; 2013). Bititci et al. (2010) and Dunkerton and Bustard (2013) also found that HVM positively improved society by developing the economic community. This was further confirmed in the UTU company. Heinonen (2017) mentioned the value creation

to the economy of Finland. He discussed the location of the factory being in a smaller city in Finland and thus being a big provider of employment for the city, further noting that the company also provides tax money and employment for the region. Furthermore, the interviews confirmed that for most of the companies a majority of the manufacturing is done in Finland (Heinonen, 2017; Anonymous 1, 2017; Anonymous 2, 2017). This means they have been able to provide employment and contribute to the overall GDP of Finland. Rouvinen (2017) also noted there to be around 800 employees in the Helsinki unit of GE Healthcare Finland and stated that in 2016 they had sold their medical devices to over 100 countries. This highlights the significant role that high value manufacturing companies pay on exports and wealth in the country. These findings cannot however confirm the correlation between exports of products made from HVM companies and overall economic growth that was claimed in the literature (Carvalho et al., 2013). Another interesting difference found between the literature and conceptual framework and the research findings was in terms of the brand leadership strategy discussion. The literature discussed the implementation of the brand leadership strategy in high value manufacturing companies to establish high brand recognition (Bititci et al., 2010; MacBryde et al., 2013). The researchers noted that this strategy creates profitability and positively impacts the economy. It was also demonstrated in the conceptual framework as one important HVM approach that leads to GDP growth and profitability. In the findings, the interviewees mentioned that one aim for them is to be market leaders with their products, however, they did not mention the implementation of the brand leadership strategy or its benefits. Heinonen (2017) simply mentioned being a more recognized brand than local competitors but also noted that their major competitors had stronger brands. Furthermore, Anonymous 2 (2017) concluded that they had different levels of brand recognition in their company but did not use their brand to sell the product. This means that the findings cannot confirm the use of the brand leadership strategy to increase profitability and overall GDP as was demonstrated in the conceptual framework. This discrepancy also highlights the many different approaches of high value manufacturing. Furthermore, that all the approaches do not need to be adopted in order to confirm benefits for the economy.

Environmental benefits were also supported in the research findings. One specific benefit mentioned in the literature is the reduction of resources used and the extension

of the product life cycle (Livesey, 2006; University of Cambridge, 2016). The idea of lean and 'just in time' manufacturing reduces the number of resources and materials used thus reduces waste. All the interviewees discussed manufacturing to order and efficiency in material use and confirmed the relationship between 'just in time' manufacturing and being environmentally sustainable as discussed in the conceptual framework. Furthermore, recycling and the extension of the product life cycle was also brought up in the interviews. Both Heinonen (2017) and Anonymous 1 (2017) discussed their focus on recycling all possible waste of the metal and scraps that were easily found, with Heinonen (2017) further concluding their waste to be less than the value of their production and that the recycling is economical for the company as they get money from the recycling. Rouvinen (2017) also agreed on the importance of the environment and noted a focus on extending the product life and creating innovations to reduce energy consumption. However, one company did mention that although they utilized lean implementation they had very little recycling included in their product life cycle (Anonymous 2, 2017). Furthermore, the interviewees did not discuss use of renewable resources in their production. Nonetheless, the recycling and product life extension findings confirm the benefits of high value manufacturing to the environment mentioned in the academic literature.

### **5.3. High Value Manufacturing Strategic Approaches**

The analysis of the findings found there to be several high value manufacturing approaches that can be utilized in a company's manufacturing strategy to create benefits internally and externally for the company. Several of the approaches mentioned in the literature review were utilized by the HVM companies successfully. However, there were discrepancies between the previous checklist and the approaches utilized by the companies. Certain approaches mentioned in the checklist were not found to be utilized by the companies to create benefits for the company, economy, and environment. For example, the participants did not mention the use of the brand leadership strategy nor servitization as part of their high value manufacturing. Furthermore, the analysis revealed certain approaches of high value manufacturing that created benefits for the companies that were not discussed in the previous HVM



approach checklist. For instance, Heinonen (2017) mentioned improvements in the logistical layout of the factory, an increase in employee level responsibility, and reliability as a supplier with delivery punctuality. These improvements have created profit and customer and employee satisfaction benefits for the company. Rouvinen (2017) also discussed the use of a piece flow that minimizes extra effort and waste. Overall, because of the differences between the literature and the research findings, a new high value manufacturing approach checklist can be created. The new HVM checklist is seen below and highlights the approaches utilized by HVM companies to generate profit benefits, an increase in efficiency, employee and customer satisfaction, minimal waste, cost savings, and sustainable and environmentally friendly manufacturing.

1. Customer-based solutions
2. Short lead time and fast delivery times
3. 'Just in time' manufacturing
4. Innovative design
5. Ownership of entire product life cycle with additional services
6. Satisfy customers' needs with entire product/service range
7. Coordinated communication in entire manufacturing process
8. Increase in resource and material efficiency
9. Increase in automation
10. Extending product life cycle through recycling
11. Using Lean manufacturing, systematic way of reducing waste
12. Efficient logistical flow of materials (one piece flow)
13. Improved logistical layout
14. Increase in employee level efficiency and production
15. Reliable supplier with delivery punctuality

## **6. CONCLUSIONS**

This section provides the conclusions of the research study. The purpose of this section is to discuss the main findings of the research, outline the implications of this research in terms of international business, and lastly provide suggestions for further research on this topic.

### **6.1. Main Findings**

The aim of this research study was to explore high value manufacturing companies and the benefits of its adoption on the company and its stakeholders. Furthermore, to analysis the potential of HVM to be utilized as a strategic approach for companies. There were three main objectives for this research study. They included examining sectors adopting HVM, the drivers of the adoption, and lastly the benefits and the possibility of HVM as a strategic approach for companies. Overall, the research findings supported several benefits that were discussed in the literature review. The use of the semi-structured interviews with high value manufacturing companies helped confirm the academic literature on the topic of HVM and its benefits. There were, however, differences between the literature and the findings. The findings did not confirm certain benefits but it also uncovered certain benefits that were not discussed in the scholarly literature on high value manufacturing

Several profit and value benefits of high value manufacturing that were discussed in the review of the literature were also confirmed in the findings of the qualitative research. The reduction of production costs was one such benefit that further shifted the value created to the output. The HVM companies were able to utilize the approach of manufacturing solely to order and decrease major production costs. The companies were also able to increase their delivery performance and lead time efficiency which further strengths the benefit of these HVM approaches. The 'just in time' manufacturing implementation further supports the idea that HVM decreases production costs as it completely eliminates the need for inventory space and reduces major material waste. Another benefit that also results from the reduction of production costs is an increase

in efficiency. This is a major benefit because the findings of the study showcased that companies that use HVM and more specifically lean implementation are able to increase their production capabilities with the same amount of resources. There were several cases that showed HVM companies significantly eliminating unnecessary production steps. This overtly strengthened the efficiency of their production and made the transformation of the product from start to finish more fluid. The increase in profitability and growth were also confirmed as benefits of HVM. The technological know-how of these companies is a lot more advanced compared to traditional manufacturing. Therefore, HVM companies can handle increasing production volumes efficiently and increase their overall growth. It can also be confirmed that customization is a significant approach in HVM that benefits the company in several ways. Customer-based solutions increase customer satisfaction, market value of the product, and most importantly the competitiveness of the company. The interview findings highlighted HVM's ability to satisfy customer needs and create a sustainable differentiation for companies. It was also confirmed that HVM companies create value that benefit the economy and environment. Companies that use high value manufacturing are able to maintain profitability and sustainability in developed countries and thus provide employment and contribute to the country's wealth and GDP. Furthermore, these companies understand the importance of environmental sustainability and thus focus on extending their product life cycle and recycling. Overall, several benefits of high value manufacturing implementation were uncovered in this research study.

There are however discrepancies that must still be discussed between the literature and the findings. One difference that still remains between the two is the fact that employee satisfaction was not mentioned in the literature but found to be an important benefit in the findings. This is mainly because the literature focused on overall profit benefits of HVM. Another important discrepancy was the fact that the brand leadership strategy was not addressed in the research findings. This strategy was found to be an important approach in the literature and was emphasized as a way to increase profitability and a country's GDP. This seemed to be due to the fact that the interviewees were unaware of the brand leadership strategy or the company's brand recognition strategy. However, this also highlights the many approaches of HVM and the idea that profitability and the economy can benefit from other HVM approaches.

The findings of the research showcase companies from a variety of sectors utilizing the approaches of high value manufacturing successfully. The adoption of high value manufacturing for instance customer-based solutions, 'just in time' manufacturing, and lean manufacturing resulted in many benefits for the companies. This further highlights the possibility of other companies in Europe to utilize this type of manufacturing as a strategic approach to increase profitability and maintain a competitive advantage. Furthermore, the research shows that manufacturing can be efficient and sustainable in developed countries and result in economic growth for Europe.

## **6.2. Implications for International Business**

High value manufacturing is an innovative phenomenon that goes beyond the idea of traditional manufacturing. In recent years, several companies have started adopting manufacturing approaches with high value added. The adoption of high value manufacturing is increasingly becoming more popular as companies are starting to consider it a better alternative to traditional manufacturing. The adoption of these approaches positively affects the entirety of a company's manufacturing and supply chain management. This research study provides a closer look at the phenomenon and the viability of this type of manufacturing to save the manufacturing sector in Europe which has not been researched. Therefore, this study helps better understand the approaches of HVM and how companies can benefit and utilize this type of manufacturing for their own supply chain strategy.

## **6.3. Suggestions for Further Research**

This research study highlights the importance of further research on this topic in regards to the potential of high value manufacturing in Europe. This is mainly due to the fact that the research on this topic is completely based on short-term findings.

There are many suggestions for further research to develop the knowledge on this topic. One particular suggestion is to do conduct more long-term research on high value manufacturing companies in Europe, for instance, case studies on companies that have adopted the high value manufacturing approaches. This will help provide more in-depth findings on the long-term benefits of HVM implementation. Another suggestion is to collect more numerical data on the companies in relation to their contribution to the country's economy. This will help establish more concrete findings on how high value manufacturing is creating economic growth in Europe. The final suggestion would be to compare companies that use high value manufacturing in Europe to companies using high volume low value manufacturing in developing countries to better understand how this type of manufacturing can benefit the manufacturing sector in Europe and overall economic growth.

The suggestions confirm that there is limited research on the benefits of high value manufacturing and thus there are many possibilities to expand knowledge on the topic.

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## APPENDICES

### Appendix 1 – High Value Manufacturing Company Interview Crib Sheet

1. How much of your manufacturing is located in Finland or Europe?
2. (If majority offshored) Are you aiming to bring back the manufacturing to Europe?
3. What are the two most important improvements that you have made to your manufacturing processes and management over the last 5 years?
4. What were the drivers for instigating these projects?
5. What benefits, savings, or advantages have been seen? (I.E. increase level of profit margin, competitive advantage, sustainability)
6. What are the long-term benefits and advantages of these manufacturing improvement projects?
7. How are you creating value for your stakeholders?
8. Do you consider yourself a high value manufacturing company? Why?
9. What do you see for the future of your company's manufacturing?
10. For this question, I will say an element from the High Value Manufacturing Checklist for example "We focus on customer-based solutions" and then ask you to mark on a scale of 1 to 5 with 1 "being no or never" and 5 being "absolutely agree and always" your level of focus for each HVM element.

## **Appendix 2 – HVM Check-list for Question 10**

1. Customer-based solutions (meaning specific target segment, customization)
2. High brand recognition (using some type of brand leadership strategy)
3. Fast delivery time/ short “lead time” not manufacturing for storage, for example making to order and not using a make for stock strategy
4. Not aiming to be a cost leader, nor competing on cost alone
5. Value creation to multiple stakeholders (company profitability, economy, environment)
6. Servitization (selling the product as a service)
7. Innovative design
8. Owning entire “product” life cycle and the addition of support and service for entire life cycle of product
9. Satisfy customers’ needs with entire product/service range
10. Coordinated communication in entire manufacturing process
11. Increase in resource and material efficiency, creating production that is environmentally friendly
12. Increase in automation
13. Extending product life cycle (recycling)
14. Using Lean manufacturing, systematic way of reducing waste



