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Is the world really “flat”?
Cultural issues in manufacturing industry

Doctoral Dissertation

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To my parents

“Tra la partenza e il traguardo,
in mezzo c’è tutto il resto,
e tutto il resto è giorno dopo giorno,
e giorno dopo giorno è silenziosamente costruire”
(Niccolò Fabi – Costruire)

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ABSTRACT

Why should culture matter? Nowadays, globalization has brought companies to compete around the world: local companies have started to act globally, and facilities and subsidiaries have been founded, with the aim to exploit cost opportunities as well as market possibilities. It follows, that manufacturing strategies are spread across the world; as a consequence managers have started to heed to cultural values that are different from their own (Matters et al. (2010)).

The central idea of the thesis, is that what is "best" for one company might not be so for another. In line with this, among the several contingencies, culture, and in particular *national culture,* might exert a relevant role. The suggestion behind the research is that national cultural values might affect the way through which companies act and consequently the way through which businesses are managed and goals are achieved (e.g., Naor et al., 2010); a nuance that will be further delineated throughout the dissertation. In a global context, the role of cultural values might be pervasive in many aspects of companies' activities (e.g., human resources management; accounting; organization): this dissertation focuses on the operational area of companies. Specifically, the study addresses how national cultural values can explain differences in terms of implementation and effectiveness of the manufacturing "best" practices.

Essentially, three research articles constitute the core of the dissertation, in which this issue is analyzed adopting different approaches. The first article investigates how, given a set of competitive priorities, the level of the investments applied by companies in manufacturing "best" practices change, according to the national culture of the country in which the plant is located. The second study, by assuming a supply chain perspective, addresses the role of national cultural values in affect the extent through which companies have invested in information sharing, either with their customers and suppliers. Lastly, the third article, focuses on those manufacturing practices that have been deemed as a suitable to cope with market uncertainties, i.e. forecasting and flexibility, investigating how national cultural values might change their effectiveness in improve companies' cost performance.

The thesis aims to contribute to the research stream of global manufacturing strategy and supply chain management, by shedding light on the relevance of national cultural values. From a managerial perspective, in a era in which *local* has assumed the same meaning of *global*, managers should recognize the importance of national cultural values when decide to

apply investments abroad, in order to put in place programmes that are effective in improve companies' performance. The main results, show how national cultural values plays a role both in affecting the way through which companies have invested in improvement programmes, as well as in terms of their effectiveness.

Keywords: Manufacturing practices, Supply Chain Management, National culture

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Three years have gone. Quickly. As usual, I have not noticed. Three years of people that I met, that I started to know, that have started to know me. Three years that I don’t want to forget. Three years of my life. Three years of works. Three years of experiences. Thanks to everybody who had trust in me.

CHAPTER ONE.
Introduction

1.1 PURPOSE

Why a study about culture? In the field of management, the role of culture, as an aspect able to explain differences in managers' behavior, has attracted the attention of many scholars and researchers, moving from the concept of "organizational culture" (Schein, 1984) to that of "national culture" (Hofstede, 1980). But, what is culture? and how we can define it? Essentially, culture is a concept too holistic to be encapsulated in a unique definition: it is founded on historical and ethnical heritage, religious beliefs, common languages and ideologies, which, taken together, express a common experience and a sharing of values and identities among people. According to House et al. (2004, p. 15), "culture is defined as shared motives, values, beliefs, identities, and interpretations or meanings of significant events that result from common experiences of members of collectives that are transmitted across generations". According to the mentioned authors, this definition is firstly reported since underlines either the concepts of national, or societal, culture as well as of organizational culture. The definition highlights common experiences, collectivity, and the fact that values, identities and beliefs are transmitted across generations. But, how House et al. (2004, p. 15) have defined national, or societal, culture? Essentially, as the communality of languages, ideologies (e.g., religious, political) ethnic heritage and history. Similarly, the mentioned authors have stated how organizational culture "consist of commonly used nomenclature within an organization, shared organizational values, and organizational history". Yet, both the definitions, underline the concepts of community and sharing between members, either at societal level as well as at organizational one.

In this vein, Hofstede (1980, p. 260) has suggested how culture and, more specifically, national culture, might be considered as "the collective programming of the mind that distinguishes one group or category of people from another", reflecting both its sociological and physiological aspect. National culture mirrors the people's values and beliefs at the national level, and might be considered as a proxy of the culture that permeates organizations. The suggestion, though simplified, is that the environment in which a company operates, affects the way through which businesses are managed; it follows that "cultural influences on management are most clearly recognizable at the national level" (Hofstede, 1994, p.4); an

argument that implies the whole dissertation. In line with this, national culture is a "narrow" definition of culture; that becomes relevant in the light of its influence on management (e.g., Hofstede, 1983a). Specifically, although national culture excludes differences between groups (e.g., sex, regions, families) and it is an average pattern of beliefs and values, represents "a commonly acceptable, well defined, and empirically based terminology to describe cultures" (Hofstede, 1983a, p. 77).

As previously stated, management literature has devoted attention to the role of national cultural values. Kirkman et al. (2006) have shown how the Hofstede's taxonomy has been applied in several studies, between 1980 and 2002, shedding light on differences across countries in terms of managerial issues, such as decision-making, human resource management, leadership, entry-model, negotiation. In the field of operations management, since companies have started to act globally, national cultural values have become relevant in explain differences concerning the international operational decision-making (Pagell et al., 2005). Specifically, with the aim to provide guidelines for future research, Prasad and Babbar (2000) have suggested how national culture might influence several areas of companies; among these forecasting, scheduling, facility location. In line with this, the transferability and applicability of the manufacturing "best" practices across plants located in different countries in the world has become a relevant issue, as witnessed by the Womack et al. (1990)'s book "the machine that changed the world". As stated in the summary of the dissertation, the idea is that what is "best" for one company might not be so for another, due to differences in national culture.

Therefore, why does this thesis focuses on culture? Essentially, the central thought is traceable in Metters et al. (2010, p. 178) that in turn rely on Voss et al. (2004, p. 214) according to which "studies conducted in one country may not be generalizable to others because of national culture effects". The thesis acknowledges that manufacturing practices are not universal; several contingencies might affect their effective implementation: according to Sousa and Voss (2008), national culture is one of them. Lastly, the House et al. (2004)'s suggestion might become relevant. Specifically, even if the world is becoming "flat" (Friedman, 2006), due to globalization forces, cultural differences might still arise and further amplified: specifically, "as economic borders come down, cultural barrier could go up, thus presenting new challenges and opportunities in business" (House et al., 2004, p. 5). In this sense, globalization has posed several challenges and one of them regards national cultural values: specifically, although a "convergence" across countries of values, beliefs and

management practices could occur, due to cross-border interactions, national cultural values change slowly (Hofstede, 1983a): therefore, managers should acknowledge that cultural diversities across countries in the world exist, overcoming the biases imposed by their own culture when undertaking decisions.

1.2 CULTURAL FRAMEWORKS

Over the years, a lot of efforts have been made with the aim to conceptualize culture. The first attempt was done at the end of 70s. Hall (1976) has classified countries in terms of the way through which people communicate with each other. Specifically, in the Hall's taxonomy, a dichotomy emerged: countries in which people tend to send their message explicitly, and countries in which people tend to rely more on indirect communication. The first set of countries is classified as "low context" (e.g., Australia, German) whilst the second one as "high context"(e.g., Japan, China). Noteworthy, Hall (1983) has introduced a further classification of countries, considering the way through which people perceive time: in this sense, people in monochronic cultures tend to do one thing at once, whilst polychronic cultures tend to pursue different things at the same time. Monochronic view of time, is typical of western countries, whilst polychronic view of non-western ones.

Probably, the most well-known cultural framework is the Hofstede's taxonomy (1980). Hofstede, through a survey conducted among more than 100,000 IBM employees in the world, has classified national cultural values through four dimension, with a fifth index, long-term orientation, added later in the model. Each dimension is measured through a score. Power distance (PDI) reflects how people is comfortable with decisions taken from the most powerful members in societies. Essentially, according to Hofstede (1980), it expresses "the degree to which the less powerful members of a society accept and expect that power is distributed unequally". Individualism-collectivism (IDV), reflects how people tend to act for their own interests, rather than for the society's goals, and can be defined as "a preference for loosely-knit social framework in which individuals are expected to take care of themselves and their immediate families only". The mentioned trait underlines the people attitude to pursue goals, and is strictly tied with power distance, due to the country' s wealth. Uncertainty avoidance (UAI) is a dimension that reflects how people is comfortable with uncertainties and risks. Specifically, uncertainty avoidance, expresses "the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity". The suggestion, is that people in uncertainty avoidance cultures, tend to rely more on norms, rules

and procedures in order to strive with unforeseen situation. Furthermore, masculinity-femininity reflects "a preference in society for achievement, heroism, assertiveness and material reward for the success"; masculinity cultures tend to be competitive, assertive and aggressive, whilst femininity ones tender, modest and cooperatives. The fifth dimension, long-term orientation (LTO), "can be interpreted as dealing with society's search for virtue"; the suggestion is that long-term oriented cultures, will be more willing to invest for future, delaying immediate gratification.

Trompenaars and Hampden-Turner (1998), have provided a cultural framework in which cultural differences are assessed through seven dimensions. Specifically, these authors have built a model in which countries are classified on the basis of the solutions that people choose to solve conflicts and problems related to how relationships are managed, the passing of time, and the belief that the environment (i.e. nature) can be controlled. In line with this, seven dimensions are identified: concerning "relationships", the first dimension, universalism-particularism, refers to the extent through which people give importance at norms and procedures rather than relationships. Specifically, in a universalist culture, people believe that rules should be applied everywhere; in these cultures, rules are more important than relationships. Conversely, in a particularistic cultures, people believe that rules are dictated by the circumstances. Therefore, relationships are more important than rules. The second trait, individualism-communitarianism, reflects how people perceive the importance of the self, rather than the importance of the group. This characteristic is similar to the individualism-collectivism dimension, delineated in the Hofstede's framework. Essentially, it encompasses the people's goals orientation. The third dimension, specific-diffuse, reflects how people's personal life is involved with their work. In specific cultures, people tend to separate their personal life to their work; differently, in diffuse ones, people tend to overlap their personal life with their work experience. The fourth characteristic, delineated by Trompenaars and Hampden-Turner, neutral-emotional, reflects the way through which people show their emotions. In neutral cultures, people tend to control their feelings; in emotional ones people is more willing to show them, even in the workplace. The fifth dimension, achievement-ascription, reflects how people perceive status in societies. Specifically, in achievement cultures, performance matters; people are valued according to what they do, and not on the basis of who they are, like in ascription ones. Concerning "time", the sixth characteristic, sequential time-synchronous time, reflects how people perceive the passing of time. In sequential-time cultures, people do one thing at once, and punctuality is relevant.

Conversely, in synchronous-time cultures, people work on different things at once, seeing time as a continuous. Lastly, with refers to "environment", the seventh dimension, internal direction-outer direction, reflects the people's locus of control. Specifically, in a internal-direction culture, people believe that nature is controllable. Conversely, in a outer-direction culture, people believe that nature is not controllable: it follows, that emphasis on relationships is placed in order to avoid conflicts.

A study, in which cultural values are further analyzed, is the one of Schwartz (1999). The Schwartz's framework is specifically focuses on cultural values, defined as "the implicitly or explicitly shared ideas about what is good, right and desirable in society" (Schwartz, 1999; p. 25). The mentioned author has identified three dimensions, through which cultural differences in societies can be assessed: Autonomy-Conservatism, Hierarchy-Egalitarianism and Mastery-Harmony. The first dimension, autonomy-conservatism, reflects how people is embedded in the group, in the collectivity; this trait expresses people's autonomy as well as their goal orientation: essentially, according to Schwartz (1999, p. 27) the questions addressed are: (1) Whose interests should take precedence, the individual's or the group's? (2) To what extent are persons autonomous vs. embedded in their groups? The second dimension, hierarchy-egalitarianism, reflects the way through which a society acts in order to guarantee a responsible social behavior. Hierarchy, reflects the unequal distribution of power within a society, whilst egalitarianism reflects a society in which people tend to voluntarily cooperate with each other in order to achieve a social welfare. The third issue advanced by Schwartz, reflects how people perceive nature, as well as the environment surrounding them. Specifically, mastery reflects a society's belief in which the world can be changed and exploited; conversely, harmony expresses a society's value in which people tend to emphasize the fit, the harmony with either nature and social environment.

Lastly, the GLOBE project (House et al., 2004) is considered. The GLOBE project is the result of an extensive research effort. Specifically, it measures cultural differences in 62 countries, on the basis of responses provided by 17,300 managers from 951 organizations (House et al., 2004). Noteworthy, cultural differences are assessed either in terms of "values", i.e. what people perceive should be done in society, as well as of "behaviors", i.e. what is realized within it in terms of practices and activities. The GLOBE project encapsulates culture into nine dimensions: power distance, institutional collectivism, in-group collectivism, uncertainty avoidance, future orientation, performance orientation, gender egalitarianism, humane orientations and assertiveness. Specifically, referring to House et al. (2004), power

distance reflects “the degree to which members of an organization or society expect and agree that power should be stratified and concentrated at higher levels of an organization or government”. Similarly to the Hofstede’s framework, power distance expresses the way through which people perceive hierarchical levels and is comfortable with decisions taken from the most powerful members in a society. Differently to the Hofstede’s model, the dimension of individualism-collectivism is further explained considering institutional-collectivism and in-group collectivism. Institutional-collectivism expresses “the degree to which organizational and societal institutional practices encourage and reward collective distribution of resources and collective action”, whilst in-group collectivism “the degree to which individuals express pride, loyalty, and cohesiveness in their organization or family”. Further, similarly to Hofstede, uncertainty avoidance reflects “the extent to which members of an organization or society strive to avoid uncertainty of future events by relying on established social norms, rituals and bureaucratic practices”. Yet, future orientation, is “the degree to which individuals in organizations or societies engage in future oriented behaviors such as planning, investing in the future, and delaying individual or collective gratification” and, essentially, is quite similar to the long-term orientation trait, delineated in the Hofstede’s framework. Noteworthy, as it represents a novelty respect to the Hofstede’s model, performance orientation is “the degree to which an organizations or society encourages and rewards group members for performance improvement, innovation, high standards and excellence”. Another refinement with respect to the Hofstede’s model, is gender egalitarianism. Specifically, this trait manifests “the degree to which an organization or a society minimizes gender role differences while promoting gender equality”. Further, humane orientations, is “the degree to which individuals in organizations or societies encourage and reward individuals for being fair, altruistic, friendly, generous, caring, and kind of others.” Lastly, assertiveness is defined as the “degree to which individuals in organizations or societies are assertive, confrontational, and aggressive in social relationship”. This trait, reflects the same meaning of the masculinity-femininity dimension, delineated in the Hofstede’s framework.

The dissertation will consider two specific cultural models. Essentially, due to its extensive use (see, Kirkman et al., 2006 for a review) as well as to its validity for management research (Merrit, 2000; Magnusson et al., 2008), the Hofstede’s model is been chosen. In manufacturing research, several studies have adopted it in order to make cross-cultural comparisons (e.g., Wacker and Sprague, 1998; Flynn and Saladin, 2006). Alongside

the well-know Hofstede's model, the GLOBE project is also taken into account, following the more recent literature in the field of operations management (e.g., Kull and Wacker, Naor et al., 2010). Table 1 shows a comparison between the several cultural frameworks, by highlighting how cultures are classified.

Table 1 Cultural frameworks

Cultural frameworks	***Years***	***How are cultures classified?***
Hall	1976	*How do people communicate with each other?* High context (collectivistic) and low context (individualistic)
Hofstede	1980	Power distance, Individualism-Collectivism, Masculinity-Femininity, Uncertainty Avoidance, Long-Term orientation
Trompenaars and Hampden-Turner	1998	*How do people solve conflicts related to relationship, the passing of time and environment?* Universalism-Particularism, Individualism-Communitarianism, Neutral-Emotional, Specific-Diffuse, Achievement-Ascription, Sequential-Synchronic, Internal direction- Outer direction
Schwartz	1999	*How is the meaning of work in the life of individuals influenced by prevailing cultural value priorities?* Autonomy-Conservatism, Hierarchy-Egalitarianism, Mastery-Harmony
GLOBE project	2004	Power distance, Institutional collectivism, in-group collectivism, uncertainty avoidance, future orientation, performance orientation, gender egalitarianism, humane orientations, assertiveness

1.3 BACKGROUND

This section, briefly, summarizes the theoretical concepts, that will be further delineated throughout the dissertation: manufacturing strategy, contingency theory, "divergence" hypothesis and "convergence" hypothesis.

Manufacturing strategy, is a wide concept that reflects how companies get a competitive advantage. A company, can decide how to compete in the market, in terms of its

competitive priorities, such as cost, quality, delivery and flexibility; moreover, with the aim to increase its performance, a firm can invest in manufacturing "best" practices; the whole, acknowledging the Skinner (1969)'s suggestion, in a perspective that is consistent with its internal and external environment (see, Voss et al., 1995, 2005 for further detail).

Specifically, in this vein, the manufacturing "best" practices are the core of the dissertation, and two academic thoughts have arisen in order to analyze them: the first, named universal, acknowledges their effectiveness, in improve companies' performance, in any situation. The second, named contingent, acknowledges that their effectiveness dependent upon the context that a company is facing. This latter approach is drawn on contingency theory, the theoretical lens adopted throughout the dissertation. More in the detail, in manufacturing strand of literature, this theory has given rise to a stream of research called Operations Management Practices Contingency Research aimed to analyze the effectiveness of the manufacturing "best" practices. In this vein, Sousa and Voss (2008) have provided a critical literature review.

Similarly, the theoretical approaches adopted from a cultural point of view, are the "convergence" hypothesis and the "divergence" hypothesis. Specifically, the "convergence" hypotesis acknowledges the congruence of cultural values across countries (Form, 1979). Conversely, the "divergence" hypothesis (Child and Kieser, 1979) acknowledges that differences across countries, due to national cultural characteristics, arise. This latter perspective is embraced throughout the dissertation, even in the light of the House et al. (2004)'s suggestion, according to which globalization might have increased the relevance of cultural diversities across countries in the world.

1.4 RESEARCH OBJECTIVES

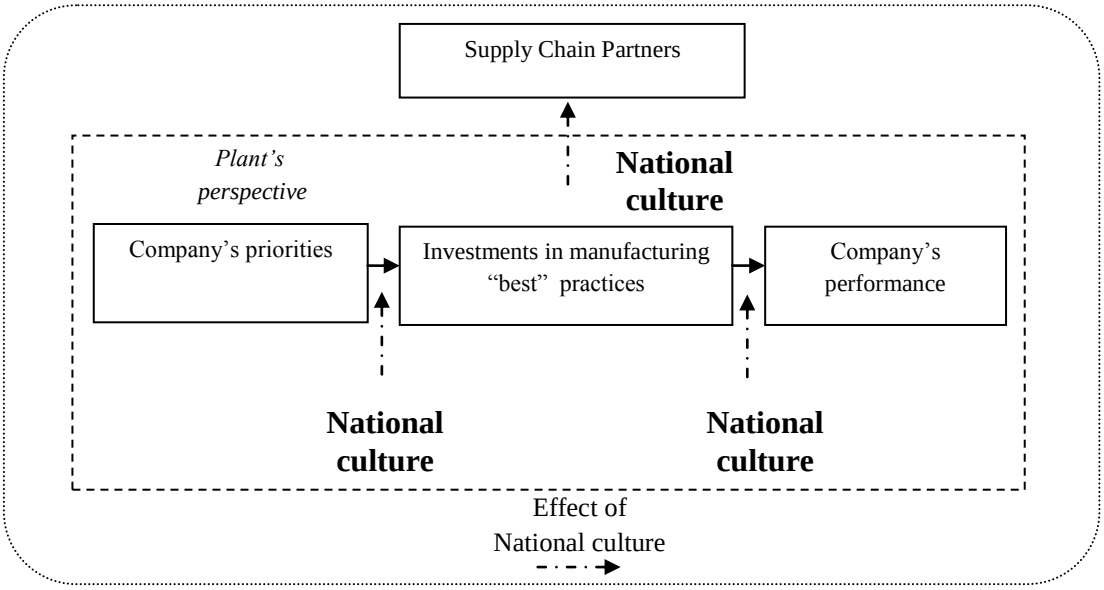
The overall objective of the dissertation is to contribute to the research strand of global manufacturing strategy and global supply chain management; the thesis aims to shed a light on the role of national cultural values in affect how a company has invested in manufacturing "best" practices, as well as on their effectiveness in improve company's performance. In this sense, literature has acknowledged the role of national culture as a contingent variable (e.g., Sousa and Voss, 2008) and a plethora of studies have addressed how national cultural values can explain differences for what concern either the implementation and the effectiveness of the manufacturing "best" practices (e.g., Kull and Wacker, 2010; Naor et al. 2010; Wiengarten et a., 2011; Vecchi and Brennan, 2011).

Specifically, national cultural values permeates organizations and, as Hofstede (1980) noted, cultural values drive people's behavior. Acknowledging this suggestion, this research considers national culture as a pervasive element, that might affect how a company invests in manufacturing "best" practices, coherently with its strategy. At the same time, national cultural values might also affect the willingness to invest in collaboration with either customers and suppliers as well as the way through which the manufacturing "best" practices are managed, fostering or hampering their effective implementation.

In this sense, increase knowledge, might be beneficial to get a closer understanding about the role of national culture for what concern the manufacturing area of companies acknowledging the Pagell (2005)'s suggestion, which has strongly advocated the importance of national culture as a construct able to explain differences in how operations management decisions are internationally carried out.

The dissertation, first, sought to shed a light on the relationship between competitive priorities and the level of the investment that a company applies in manufacturing "best" practices, considering national culture in a moderating perspective. The idea behind this study, is that companies define how to compete in the market and then invest in manufacturing "best" practices; however this link might not be straightforward since national culture might affect it. The second issue addressed, regards the role that national cultural values might exert on the willingness of a company to invest in the sharing of information in collaboration with either its customers and suppliers. In this study, national cultural values are viewed as an enabler of supply chain integration. Lastly, the dissertation considers how national culture might affect the relationship between the level of the investment that a company applies in manufacturing "best" practices and the achieved operational performances. Specifically, unforeseen demand hedge practices are considered as well as companies' cost performance. This study considers national culture in a moderating perspective; the suggestion is that the effectiveness of the unforeseen demand hedge practices changes according to the cultural characteristics of the country in which the plant is located. Figure 1 depicts as stated, showing the organization of the dissertation.

Figure 1 Organization of the dissertation



Generally speaking, the thesis research question can be summarized through two suggestions. The first, is traced in a brief history. At the beginnings of 90s, Toyota was the most successful manufacturer in the automobile industry. At the same time, General Motors's sales and revenues were falling down. Specifically, lean manufacturing practices, were deemed as the "secret" of the Toyota's success; however, when General Motor has tried to adopt them, the result was a failure. Why? Essentially, General Motor has adopted the lean manufacturing practices as there were implemented in Toyota, without adapt them to its own context. The General Motors's environment (e.g., facility, layout) was significantly different to the Toyota's one, requiring an adaptation of the lean manufacturing practices to the different context. Therefore, the first research suggestion, can be stated as follow:

RQ: Are manufacturing "best" practices effectively applied in any situation? And specifically, is there effectiveness contingent to the specific environment in which the adopting firm is operating?

The second suggestion, is traced in the increasing globalization that companies are facing. According to Dangayach and Deshmuck (2001, p. 908), nowadays, manufacturing "is no longer concentrated in one country but it's spread around the globe". It follows that, in decision-making, managers have to heed to cultural values that are different from their own. Acknowledging that cultural values might affect people's behavior, and relying on Metters et al. (2010), the second research suggestion can be stated as follow:

RQ: In the field of operation management, and specifically in manufacturing, why should culture matter?

The mentioned research suggestions, reflect, together, the overall research question of the dissertation. Specifically, the thesis aims to consider the influence of national cultural values on the implementation and effectiveness of the manufacturing "best" practices, acknowledging that, in a era in which companies act around the world, their effective transferability has become a relevant issue. Specifically, the thesis can contribute to highlight those cultural peculiarities that might foster or hinder the effective implementation of the manufacturing "best" practices. Therefore, the thesis research question is as follows:

RQ: Does the implementation and effectiveness of the manufacturing "best" practices change according to the cultural characteristics of the country in which a firm is operating?

1.5 METHODOLOGY

The abovementioned research question, is tested by relying on data gathered through two international surveys. Specifically, the cross-border nature of the surveys, is useful for what concern the thesis' objective, i.e. address the implementation and effectiveness of the manufacturing "best" practices across different countries. More in the detail, the international surveys adopted throughout the dissertation, are the fourth round of the Global Manufacturing Research Group, and the fifth edition of the International Manufacturing Strategy Survey.

The Global Manufacturing Research Group (www.gmrg.org) is a worldwide project aimed to gather data about manufacturing practices and manufacturing performance across several plants and industries, located in different countries in the world. Data are collected through a questionnaire, administered by the local research groups and properly translated from english into the foreign languages of each country where it is administered. The questionnaire is then back-translated into the english original, in order to guarantee the equivalence and validity of the survey. Data are then centralized in a unique database, and then distributed to whom has actively participated to the data gathering process. For further detail about the survey administration and the scale development, see Whybark (1997).

The data used in this dissertation, are gathered through the 4^{th} round of the Global Manufacturing Research Group, conducted between 2006 and 2009, which has lead to collect data among more than a thousand companies belonging to more than twenty countries.

Similarly, the International Manufacturing Strategy Survey was originally launched by London Business School and Chalmers University of Technology with the aim to study manufacturing and supply chain strategies within assembly industry. The questionnaire is simultaneously distributed by the local research group in different countries, and then responses are gathered in a unique database, available to whom has actively participated in the data collection process. Data are gathered in the native language of each countries, and then back-translated in order to check for consistency. Companies are randomly selected from economic datasets, and the operations, production or plant managers are contacted and asked to assist in the research.

The data used in this dissertation, are gathered through the V edition of the International Manufacturing Strategy Survey, conducted between 2006 and 2009, through which have been gathered data among 729 companies belonging to 17 countries.

1.6 THESIS OUTLINE

The remainder of the thesis, is dedicated to show the three research articles, that constitute the core of the dissertation. The three articles share the same aim: i.e. assess how, national cultural diversities across countries, might affect the extent through which a company has invested in manufacturing "best" practice, as well as their effectiveness.

In line with this, the first study, detailed in Chapter 2, shows how the level of the investments in the manufacturing "best" practices, which a company, coherently with its competitive priorities, applies, change according to the cultural characteristics of the country, in which the plant is located. In this article, national culture is assessed in a moderating perspective; an approach adopted in previous operational management studies, dealing with cross-cultural comparisons (e.g., Kull and Wacker, 2010).

The second study, detailed in Chapter 3, assumes a different perspective by considering supply chain. Specifically, the article shows how the level of the investments that a focal company applies in collaboration either with its customers and suppliers is affected by the national cultural characteristics of country in which the company's plant is located. The article assesses national culture considering two specific cultural traits: individualism-collectivism and power distance. As previously stated, individualism-collectivism and power distance are inversely related, due to the country's wealth. Therefore, according to Singelis et al. (1995), differences in national cultural characteristics are further analyzed, considering individualism-collectivism and power distance together, under the common configuration of

vertical collectivism-horizontal individualism. Moreover, among the activities that allow supply chain integration, the article focuses on information sharing.

In the third study, detailed in Chapter 4, the issue concerning how national culture might affect the effectiveness of the manufacturing "best" practices is explored. Specifically, the manufacturing "best" practices considered in the study, are those that have been deemed as suitable to cope with risks and uncertainties: forecasting and flexibility. In this sense, the article shows how the effectiveness of these manufacturing "best" practices in improve company's cost performance, change according to the national cultural characteristics of the country in which the plant is located. Specifically, coherently with the purpose of the article, i.e. to assess the role of national culture in affect the effectiveness of the unforeseen demand hedge practices, two specific cultural traits, drawn from the GLOBE project, are considered: uncertainty avoidance and future orientation.

Finally, conclusions, theoretical and managerial implications as well as limitations are shown in Chapter 5, with the aim to provide suggestion and contributions, both to theory and practice.

CHAPTER TWO.
Competitive priorities and manufacturing practices: does national culture matter?

2.1 INTRODUCTION

The role of manufacturing strategy in achieving competitive advantage is an important issue in the Operations Management literature, and wide attention has been paid on how companies decide to compete through manufacturing, thus on which elements influence their internal strategy (e.g., Avella et al., 2001).

With the rising of globalization, local companies have begun to compete around the world and new facilities and subsidiary have been founded beyond national boundaries in order to exploit cost opportunities as well as markets possibilities. Culture has thus increased its relevance and literature in different managerial fields has begun to paid attention to the role of cultural characteristics in the definition of manager's behavior and in the structure of managerial process, moving from the concept of "corporate culture" to that of "national culture" (Schein, 1984; Hofstede, 1994; Hope and Muehlemann, 2001).

As traced in Metters et al. (2010, p.178), the issue "why should culture matter?" has increased its relevance. Nowadays, investments in manufacturing are spread across the globe, and managers have to heed to cultural values that are different from their own (Kull and Wacker, 2010). Thereby, they should recognize that culture can affect the way through which people act, and consequently how businesses are managed and goals are achieved.

As a consequence, several scholars have discussed how operational management decisions are carried out internationally, identifying relevant relationship. Attention has been paid to the effectiveness of the manufacturing "best" practices, arguing their transferability from one country to another. The key question has been whether, and under which conditions, the manufacturing "best" practices would be equally effective across different countries (Prasad and Babbar, 2000; Voss and Blackmon, 1996 1998; Ketokivi and Schroeder, 2004a,b; Rungtusanatham et al., 2005; Power et al., 2010; Wiengarten et al., 2011).

One of the most known cases, where the transferability of the manufacturing "best" practices has been studied, is the lean manufacturing field. With the aim to understand the characteristics of lean production and whether these practices could be successfully

transferred to other plants, Womack et al. (1990) have compared the "Western" plants (General Motor's Framingham plant) to the Toyota's plants (Takaoka plant). One of the key results was that, in the case of General Motor, adopting lean manufacturing practices was not easy; the General Motors's environment (e.g., labor force, supplier relationship, market dynamics, organization culture) was significantly different to the Japanese one, requiring the "lean" philosophy to adapt to the different context, strengthening the fact that manufacturing practices cannot be transferred as they are across plants located in different countries; the local peculiarities (e.g., cultural setting) should be taken into proper account.

In this article, attention is paid to national culture since "cultural influences on management are most clearly recognizable at the national level" (Hofstede, 1994, p.4). The aim is to understand the role exerted by national culture in moderating the relationship between competitive priorities and manufacturing practices, as well as to extend the results of Wiengarten et al. (2011) by considering the competitive goals that manufacturing companies define.

The research question is as follows: given a specific set of competitive priorities, does national culture affect the extent through which companies decide to invest in manufacturing practices?

The aim of the article is twofold. Firstly, we wish to contribute to the literature on global manufacturing strategy considering the relationship between the way through which companies have decided to compete and the investment in manufacturing practices apply in order to achieve competitive advantage. Theoretically, we will adopt the contingency theory's lens, where national culture will act as contingent variable. Secondly, we wish to reinforce the findings concerning the role of national culture as a construct able to explain differences concerning the operational management decisions. From a managerial point of view, it's intriguing to understand how companies decide to invest in different cultural setting, coherently with the plant's competitive priorities, in order to carried out investment that are consistent with the local environment.

The article is structured as follows. Initially, a detailed literature review allows us to understand why the mentioned research question is relevant and thus justifies the research. Then the research framework is discussed and the empirical methodology is described. Statistical results are then shown and their implications are properly explained. Finally, we draw conclusions and we highlight possible areas of future research.

2.2 RESEARCH BACKGROUND AND OBJECTIVES

Starting from Skinner's (1969) article, the concept of manufacturing strategy has attracted the attention of many scholars and researchers over time, leading to the development of several perspectives and approaches. These efforts have led to different points of view and three main paradigms have emerged (Voss 1995, 2005).

Competing through manufacturing refers to the role of manufacturing as a competitive weapon: as corporate strategy should be aligned with the marketplace in terms of competitive forces, so a proper manufacturing strategy should be defined in order to achieve a competitive advantage that is sustainable over time (Hayes and Pisano, 1994; Porter, 1980; Voss, 1995). A firm should strategically decide how to compete within a market in terms of its competitive priorities such as cost, quality, delivery and flexibility, as well as align them with the market requirements in order to create manufacturing capabilities and achieve a competitive advantage (Ward et al., 1996).

The strategic choice paradigm reflects the several choices that a company can make and is related to the concept of fit (Skinner, 1969; Schniederjans and Cao, 2009) as well as to the contingency theory *"according to which internal and external consistency between manufacturing strategy choices increases performance"* (Doty et al, 1993; Drazin and Van de Ven, 1985; Sousa and Voss, 2008; Venkatraman, 1989).

Contingency theory states that an organization adapts itself with the changing contextual conditions, in order to maintain or achieve better performance (Meyer et al., 1993; Donaldson, 2001; Sousa and Voss, 2008). Starting from the organizational and strategic management literature, this perspective has been applied in many fields such as new product development (McCarthy et al., 2006), human resource management (Delery and Doty, 1996) and demand forecasting (Kalchschmidt, 2012). In the manufacturing strand of literature, Sousa and Voss (2008) have argued the rise of the Operations Management Practice Contingency Research (OM PCR), addressed to analyze the effectiveness of the manufacturing "best" practices adoption on operational performance, providing a critical review.

Manufacturing practices can be defined as an established process that firms have put in place in order to enhance their way to make business (Voss et al, 1997). Manufacturing practices refer to different areas of intervention and are often clustered into quality practices,

plant and equipment practices, innovation - new product development practices and logistics and concurrent engineering practices (Voss et al., 1995, 1998; Laugen et al., 2005).

However, there is not a clear and unique definition about what best practices are. Two streams of research have arisen: the first defines best practices as those practices that lead to superior performance, and is related to the concept of World Class Manufacturing (Camp, 1989; Hayes and Wheelwright, 1984; Schonberger, 1986; Voss, 1995). The second suggests that best practices are those practices adopted by the best performing companies and take into account the contingency theory approach (Davies and Kochhar, 2002; Laugen et al., 2005).

According to the strategic choice paradigm (fit) and to the contingency theory approach, several authors have suggested how the manufacturing "best" practices should be analyzed within the context in which the adopting firms are operating (Doty et al., 1993; Laugen et al., 2005; Davies and Kochhar, 2002; Ketokivi and Schroeder, 2004; Powell, 1995). In this vein, different contingencies might affect their effectiveness. Scholars have identified four broad categories, through which contingencies variables can be clustered: (i) firm size, (ii) strategic context, (iii) context variables, (iv) national context and culture (Sousa and Voss, 2008).

In this strand, Cagliano et al. (2001) have focused on the firm size, analyzing SMEs. Shah and Ward (2003) have conducted a study aimed to examine how size, age and unionization status influence the implementation of lean manufacturing practices. Sousa and Voss (2001) have addressed the strategic context, in order to verify the contingent effects that variables such as type of production process, product complexity, product customization, product volume, have on the effectiveness of the manufacturing "best" practices. Kim and Arnold (1993) have focused on context, showing the crucial role played by industry.

Lastly, national context and culture is considered. Pagell et al. (2005) have strongly advocated the relevance of national culture as a construct able to explain differences in how operations management decisions are internationally carried out. According to these authors, the International Operations Management (IOM) literature is increasing in the last years, and articles dealing with national culture are typically associated to this research strand.

Reviewing the literature, a plethora of studies have addressed how national context and culture explain differences in the manufacturing "best" practices effectiveness. The idea behind these studies, is that what is "best" in one country might not be so in another. In this strand, Flynn and Saladin (2006) and Vecchi and Brennan (2011) have studied the role of culture about quality practices and quality management, Kaasa and Vadi (2010) and Wacker and Sprague (1998) concerning innovation and forecasting practices, Voss and Blackmon

(1996, 1998) have considered differences among national contexts, strategic time orientation and parent ownership and Rungtusanatham et al. (2005) have shown how the adoption of TQM can differ across countries. In a similar vein, Power et al. (2010) have compared Asiatic and Western countries in order to shed a light on the importance of national culture in explain differences in the investments in manufacturing practices and performance outcomes, whilst Wiengarten et al. (2011) have conducted a study in which national culture act as a moderating variable on the relationship between investments in manufacturing practices and operational performance. Further, Wu and Zhang (2013) have provided a perspective in which the effectiveness of the quality management practices is analyzed within a specific environment (i.e. China), arguing their findings in the light of the changing national culture characteristics in the mentioned country. These researches have shown how the effectiveness of the manufacturing "best" practices can differ according to the culture of the country in which they are applied. Further, Chung Su and Chen (2013) have taken into account individualism-collectivism, in order to assess how this cultural trait moderates the relationship between the learning mechanisms (i.e. conceptual learning and operational learning) and operational performance, arguing the relevance of the mentioned cultural characteristic.

A scarcely investigated topic is the relationship between competitive priorities and investments in manufacturing practices. Some works have considered the role of competitive priorities in the definition of "best" practices, as well as the fit between them and manufacturing objectives (Hayes and Wheelwright, 1984; Hill, 1993; Spring and Boaden, 1997; Flynn et al., 1999; Dangayach and Deshmukh, 2001; Ketokivi and Schroeder 2004; Voss 2005; Peng et al. 2011). Further, literature has highlighted how competitive priorities can differ across countries (Noble, 1993), as well as the existence of differences in the managerial focus (Dangayach and Deshmukh, 2001). Other authors have also considered the role of manufacturing strategy and organizational culture, suggesting the fit between these two dimensions (Bates et al., 1995).

Many articles have highlighted the importance that taxonomies have in order to classify firms and identify strategic groups (Miller and Roth, 1994; Bozarth and McDermott, 1998; Frohlich and Dixon, 2001; Zhao et.al, 2006). According to Miller and Roth (1994), the best way to assess the consistency between business strategy and manufacturing strategy is to build a taxonomy, adopting the competitive goals of each company. In their article, Miller and Roth (1994) have identified three manufacturing strategic groups, and have named them

"innovators", "caretakers" and "marketeers". This taxonomy has been further validated in Frohlich and Dixon (2011) and in Zhao et al. (2006).

Previous research (Flynn and Saladin, 2006; Kaasa and Vadi, 2010; Wacker and Sprague, 1998, Cagliano et al., 2011; Wiengarten et al., 2011) has assessed national culture through the Hofstede's model (1980). This author realized a framework able to capture cultural differences between countries, and has defined culture as the collective programming of the mind, which distinguishes the members of one group, or category of people, from another. National culture is assessed through four indexes named, respectively, power distance (PDI), individualism-collectivism (IDV), masculinity-femininity (MAS) and uncertainty avoidance (UAI). A fifth dimension, long term orientation, has been added later in the model. Each dimension is measured through a score.

Power distance reflects how people is at ease with decisions taken from the most powerful members in societies reflecting authority in hierarchical levels, individualism-collectivism the attitude of people to act for their own interests rather than for the societies' goals, masculinity-femininity the degree to which the gender characteristics are well defined and uncertainty avoidance the degree to which people is comfortable with uncertainty situations and strive to avoid them. Although several cultural models have been proposed (e.g., the GLOBE project, House et al., 2004) and despite all the criticism (McSweeney, 2002) the replicability of the Hofstede's model for management research and its validity is still remarkable (Merrit, 2000; Magnusson et al., 2008). Hofstede's model mirrors the culture that permeates the organizations and is been chosen for two reasons: we have decided to replicate Wiengarten et al. (2011) and it is commonly adopted in works concerning national culture comparisons (Merrit, 2000; Magnusson et al., 2008).

From a theoretical point of view, the "convergence" hypothesis and the "divergence" hypothesis might be useful in order to shed a light on the effective implementation of the manufacturing "best" practices. Several authors have adopted these perspectives in their studies dealing with cross-cultural comparisons in the field of Operations Management (Rungtusanatham et al., 2005; Naor et al., 2010; Vecchi and Brennan 2011).

The "convergence" hypothesis (Form, 1979) posits that national culture doesn't affect the implementation and the effectiveness of the manufacturing "best" practices, since industrial and technological development bring organizations to be more alike "*and adopt universal practices […] thus organizations can alter the behavior of people and undermine national culture*" (Naor et al., p. 194). Conversely, the "divergence" hypothesis (Child and

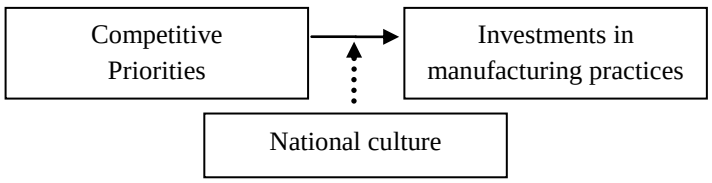
Kieser, 1979) claims that cultural traits are important in explain differences in the adoption and effectiveness of the manufacturing "best" practices. According to this thought, cultural values drive people's behaviors; therefore organizations differ across countries (Naor et al., 2010).

Starting from the above considerations, and according to the suggestion that national culture affects people's behavior and consequently the decision-making process, this article aims to contribute to OM PCR with a different point of view: we wish to take into account the relationship between manufacturing strategy and investments in manufacturing practices. In doing this, we will adopt the contingency theory approach, and we aim to analyze the impact that national culture has in moderating the mentioned relationship. Quoting Dangayach and Deshmukh (2001, p.908), in the era of globalization manufacturing is "*no longer concentrated in one country, but it's spread across the globe"*. In this sense, these authors have advocated the role of the research in order to compare manufacturing strategies and practices across countries with the aim to *"indentify specific factors responsible for given competitive edge"*.

Acknowledging the "divergence" hypothesis, the proposition we aim to test regards the moderating role exerted by national culture on the relationship between competitive priorities and manufacturing practices.

Figure 1 depicts the research framework. More in the detail, manufacturing companies define how to compete and in order to achieve their priorities invest in manufacturing practices. However, this relationship can be not straightforward, since national culture might affect it: specifically, the cultural traits of the countries in which the plant is located, might influence the extent through which investments are put in place. Therefore, from the above considerations, we posits: **RP.** *Given a set of competitive priorities, the way through which companies have invested in manufacturing practices changes according to the cultural characteristics of the countries in which companies are operating.*

Figure 1 - Research framework



2.3 RESEARCH METHODOLOGY

2.3.1 Sample description and data collection

The research proposition is tested through the data obtained from the fourth round of the Global Manufacturing Research Group (GMRG) questionnaire, administered between 2006 and 2009. The Global Manufacturing Research Group is a worldwide project carried out by international researchers belonging to different countries around the world, aimed to gather data about manufacturing practices and manufacturing performance across several industries and countries. Data are collected through a questionnaire, properly translated from english into the foreign languages of each country where it's administered, and then back-translated into the english original, in order to guarantee the equivalence and validity of the surveys (Power et al., 2010). The local research groups distribute the questionnaire simultaneously in their respective countries and the answers are collected into a unique database.

The sample is limited to those companies whose answers were valid for our analysis and to those countries for which the Hofstede's indexes are available; data concerning countries such as Albania, Croatia, Fiji, Ghana, Korea, Macedonia and Nigeria were removed. Therefore 661 items were available for the research purposes. Table 1 shows the sample description and the related Hofstede's dimensions used in the analysis. We refer to Whybark (1997) for what concerns the detail about the survey administration and the scale development. All companies belong to the manufacturing and assembly industry and the plant is the unit of analysis.

Table 1 - Sample description

Country	N	PDI	IDV	MAS	UAI	Country	N	PDI	IDV	MAS	UAI
Australia	40	36	90	61	51	Ireland	33	28	70	68	35
Austria	10	11	55	79	70	Italy	36	50	76	70	75
Brazil	28	69	38	49	76	Mexico	28	81	30	69	82
Canada	48	39	80	52	48	Poland	50	68	60	64	93
China	48	80	20	66	30	Sweden	21	31	71	5	29
Finland	128	33	63	26	59	Switzerland	16	34	68	70	58
Germany	47	35	67	66	65	Taiwan	42	58	17	45	69
Hungary	47	46	80	88	82	USA	39	40	91	62	46

Sample size: 661
Small companies (≤ 50 employees): 149
Medium companies (51- 250 employees): 325
Large companies (> 250 employees): 187
Average number of plant's employees: 455

2.3.2 Measures

Relying on the existing literature, several items, in the Global Manufacturing Research Group database, are suitable for the purpose of the article: in this regards, the items concerning competitive priorities and investments in manufacturing practices are considered.

Competitive priorities were measured through the extent to which goals such as cost (price), quality (conformance to specifications), delivery timeless, product variety-volume, new product design-innovation and environment-safety are evaluated by top management. Companies had to distribute a total score of 100 on these goals in order to describe the relative importance given to the different elements.

Similarly, investments in manufacturing practices are evaluated through the extent to which a plant has invested resources such as money, time or people in improvement programmes over the last two years, coherently with the timeframe in which the survey was administered. Responses are assessed through a likert scale ranging from "not at all" (value=1) to "a great extent" (value=7); the improvement programmes are chosen coherently to Wiengarten et al. (2011) that in turn relies on Voss et al. (1995, 1998) and Laugen et al. (2005). Two latent factors are identified and, coherently with the investments that underline, named: *"manufacturing plant and equipment"* and *"quality practices"*. Table 2 shows the explorative factor analysis carried out in order to validate the latent factors indentified in Wiengarten et al. (2011). Factor loads are all above the 0.4 threshold and Cronbach's α values exceed 0.60 for each construct, indicating high reliability of scales (Nunnally, 1994). Kaiser-Meyer-Olkin test proves further support for the factors reliability. Hence, measures concerning the company's investments in manufacturing practices were defined by averaging the items that constitute them.

National culture was measured through the Hofstede's indexes. Table 1 summarizes, for each countries in which the plant is located, the cultural values: power distance, individualism-collectivism, masculinity-femininity and uncertainty avoidance. As stated, cultural characteristics are measured through a score; higher scores indicate a stronger cultural characteristic in the country.

Lastly, control variables have been added. According to Power et al. (2010), that in turn rely on Boyer and Pagell (2000), the size of company and the firm's process choice were added as control variables. The size of company is measured through the logarithm of the total number of employees. In order to assess the firm's process choice, we have asked to respondents to indicate the percentage of orders processed as engineering to order, made to

order, assemble to order and made to stock. An index, defined as a weighted average, has been built in order to take into account the companies' propensity to be "made to stock". Given this, we defined decoupling point as follows: *Decoupling point*=(1*ETO+2*MTO+3*ATO+ 4*MTS-1)/3. To control for the plant's characteristics we have added the percentage of international ownership with the aim to capture the foreign investments into the plant, as well as the average age of the plant's production equipment. Each variable is mean centered and standardized, in order to avoid multicollinearity and compute the synergistic effects (Aiken and West, 1991; Preacher et al., 2006).

Table 2 - Factor analysis

Loading	Manufacturing plant and equipment	Loading	Quality practices
0.622	Cellular manufacturing	0.706	TQM
0.669	Factory Automation	0.714	ISO 9000
0.738	Process redesign	0.788	Supplier certification
0.783	Manufacturing throughput time	0.800	Statistical process control
0.757	Set up time reduction	0.717	Six sigma
KMO	0.768	KMO	0.816
Bartlett test	Chi-Squared 778.349	Bartlett test	Chi-Squared 934.585
Cronbach's α	0.7549	Cronbach's α	0.7967
Eigenvalue	2.5651	Eigenvalue	2.7824
Variance explained	0.5130	Variance explained	0.5565

A cluster analysis based on the relative importance of each competitive priority was performed. A K-means algorithm was applied and Calinski-Harabasz rule was used in order to assess the proper number of clusters. In the end, three manufacturing strategic groups have been identified. Table 3 shows, for each manufacturing strategic group, the mean of each competitive priority within the group (the mean is indicates as percentage), the order of importance of each competitive priority within the group and the standard error of the mean. Moreover, in bold, is indicated the highest group mean value for each competitive priority. F-statistics and P-value are related to the one-way ANOVAs. Scheffe's test has been run, and in brackets are indicated the number of the groups for which the reference group differ (significant level=0.05).

Companies belonging to the first cluster are more customer-oriented and they pay great attention to product variety-volume, new product design-innovation and environment-safety. Members are flexible and aim to introduce new products quickly. We named them "innovators", coherently to Miller and Roth (1994). Companies belonging to the second group are more quality oriented. Quality has the highest score, compared to the other clusters; other

priorities, such as cost and delivery, are also taken into account. We refer to this cluster as "marketeers". Lastly, companies belonging to the third group are more efficiency-oriented. Members put great attention to cost and the numerical score is the highest. Beside cost, companies show for each other competitive priorities the lowest valuation: an exception is product variety-volume whose numerical score is similar to the value in the second group. We refer to this cluster as "caretakers".

The research proposition is tested through a set of OLS models. In order to perform the OLS analysis each companies has been assigned (through a dummy variable) to the relative manufacturing strategic group. Figure 2 depicts the empirical model.

Figure 2 - Empirical analysis

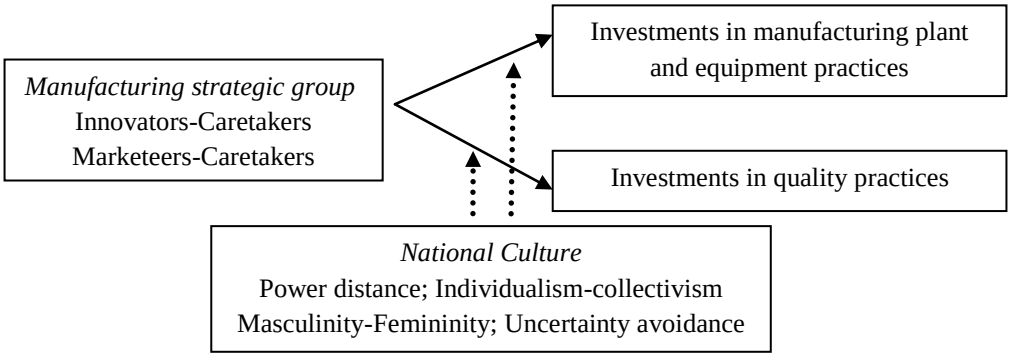


Table 3 - Manufacturing strategic groups

Competitive Priorities	INNOVATORS 1 (n=353)	MARKETEERS 2 (n=194)	CARETAKERS 3 (n=114)	F= value	P= probability
Cost (Price)					
Mean	18.54	22.19	**48.65 (2;3)**	587	0
Rank	2	2	1		
SE	6.91	8.66	10.97		
Quality (conformance to specifications)					
Mean	19.61	**35.84 (3;1)**	18.57	307.21	0
Rank	1	1	2		
SE	5.40	10.59	8.45		
Delivery timeliness					
Mean	18.22	**19.10**	13.69 (1;2)	14.86	0
Rank	3	3	3		
SE	8.16	10.61	7.25		
Product Variety-Volume					
Mean	**13.69 (2;3)**	7.10	6.87	72.34	0
Rank	6	6	4		
SE	8.38	5.62	4.74		
New Product Design-Innovation					
Mean	**15.85 (2;3)**	7.41	6.32	122.05	0
Rank	4	5	5		
SE	8.60	5.26	5.63		
Environment-Safety					
Mean	**14.08 (2;3)**	8.36	5.89	84.29	0
Rank	5	4	6		
SE	7.33	6.75	4.49		

2.4 EMPIRICAL ANALYSIS

In order to assess the research proposition we used a set of multiple regression analysis in which the manufacturing strategic groups are the independent variables ("caretakers" is the reference group) whilst the dependents ones are the investments in manufacturing practices measures, i.e. the investments in manufacturing plant and equipment practices and in manufacturing quality practices. Hierarchical approach (Wampold and Freud, 1987) has been applied in order to understand if the adding of variables contributes to increase significantly the percentage of variance explained. Initially, the effects of control variables on the dependent ones have been tested. Afterwards, we ran three different regression models adding firstly, to the previous one, the manufacturing strategic group. Then, cultural traits have been added to the second model and, lastly, in the fourth model, the synergistic effects between manufacturing strategic groups and cultural characteristics are entered as a set, in order to assess the existence of the moderation effects. Correlation matrix is shown in appendix. We controlled each step of the procedure by evaluating the variance inflation factor and the

condition indexes. The highest mean variance inflation factor is 2.78 on a cut-off point between 5 and 10 (Hair et al., 1998; Menard, 2002; Neter et al., 1989) whereas the highest condition index is 5.96 (Belsey et al. 2004). Therefore, multicollinearity is not considered an issue for any model.

2.4.1 Investments in plant and equipment practices

Results concerning the analysis carried out considering the investments in manufacturing plant and equipment practices as dependent variable are given in Tables 4-7; standardized beta coefficients are reported.

Statistical analysis shows how the cultural traits have a weak impact on the relationship between companies' priorities and the way through which these investments have been realized. Indeed, a significant contingent effect came to light only for what concern individualism-collectivism. Specifically, marketeers (i.e. quality-oriented companies) have invested more in manufacturing plant and equipment practices in a more individualistic countries rather than in a collectivistic ones ($\beta_{\text{IDV x marketeers}} = 0.129$; $p=0.057$; Δ R-squared=0.049). However the Δ R-squared is not significant. The result is shown in Table 5.

Table 4 - OLS regression results, dependent variable: investment in plant and equipment practices (moderator: PDI)

Variables	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.293**	7.750	0.000	**0.290**	7.71	0.000	**0.309**	7.990	0.000	**0.313**	8.080	0.000
International ownership	**0.065**	1.710	0.087	0.056	1.48	0.138	0.056	1.500	0.135	0.059	1.550	0.121
Age	**-0.136**	-3.710	0.000	**-0.132**	-3.59	0.000	**-0.134**	-3.670	0.000	**-0.136**	-3.720	0.000
Decoupling	-0.002	-0.040	0.966	-0.006	-0.15	0.878	-0.019	-0.520	0.605	-0.019	-0.510	0.609
Innovators				**0.142**	2.80	0.005	**0.135**	2.670	0.008	**0.141**	2.750	0.006
Marketeers				**0.120**	2.37	0.018	**0.128**	2.520	0.012	**0.135**	2.650	0.008
PDI							**-0.078**	-2.020	0.044	-0.070	-0.690	0.492
PDI x Innovators										0.031	0.370	0.714
PDI x Marketeers										-0.057	-0.830	0.405
Obs	661			661			661			661		
Prob > F	0.0000			0.0000			0.0000			0.0000		
R-squared	0.1187			0.1296			0.1350			0.1390		
Adj-r squared	0.1133			0.1216			0.1258			0.1271		
Δ R-squared				0.0109**			0.0054**			0.0049		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 5 - OLS regression results, dependent variable: investment in plant and equipment practices (moderator: IDV)

Variables	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.293**	7.750	0.000	**0.290**	7.71	0.000	**0.258**	6.550	0.000	**0.263**	6.670	0.000
International ownership	**0.065**	1.710	0.087	0.056	1.48	0.138	0.054	1.440	0.150	0.054	1.430	0.153
Age	**-0.136**	-3.710	0.000	**-0.132**	-3.59	0.000	**-0.117**	-3.190	0.001	**-0.118**	-3.210	0.001
Decoupling	-0.002	-0.040	0.966	-0.006	-0.15	0.878	0.012	0.310	0.754	0.008	0.220	0.824
Innovators				**0.142**	2.80	0.005	**0.134**	2.640	0.008	**0.115**	2.220	0.027
Marketeers				**0.120**	2.37	0.018	**0.109**	2.140	0.032	**0.094**	1.820	0.069
IDV							**-0.104**	-2.640	0.009	**-0.254**	-2.820	0.005
IDV x Innovators										0.106	1.540	0.125
IDV x Marketeers										**0.129**	1.910	0.057
Obs	661			661			661			661		
Prob > F	0.0000			0.0000			0.0000			0.0000		
R-squared	0.1187			0.1296			0.1388			0.1437		
Adj-r squared	0.1133			0.1216			0.1296			0.1318		
Δ R-squared				0.0109**			0.0092***			0.0049		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 6 - OLS regression results, dependent variable: investment in plant and equipment practices (moderator: UAI)

Variables	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.293**	7.750	0.000	**0.290**	7.71	0.000	**0.282**	7.510	0.000	**0.284**	7.530	0.000
International ownership	**0.065**	1.710	0.087	0.056	1.48	0.138	0.035	0.920	0.356	0.035	0.920	0.359
Age	**-0.136**	-3.710	0.000	**-0.132**	-3.59	0.000	**-0.120**	-3.290	0.001	**-0.121**	-3.290	0.001
Decoupling	-0.002	-0.040	0.966	-0.006	-0.15	0.878	-0.016	-0.450	0.655	-0.016	-0.440	0.663
Innovators				**0.142**	2.80	0.005	**0.129**	2.550	0.011	**0.128**	2.520	0.012
Marketeers				**0.120**	2.37	0.018	**0.118**	2.330	0.020	**0.116**	2.270	0.024
UAI							**-0.109**	-2.870	0.004	-0.141	-1.640	0.102
UAI x Innovators										0.044	0.630	0.527
UAI x Marketeers										0.004	0.060	0.950
Obs	661			661			661			661		
Prob > F	0.0000			0.0000			0.0000			0.0000		
R-squared	0.1187			0.1296			0.1404			0.1413		
Adj-r squared	0.1133			0.1216			0.1312			0.1294		
Δ R-squared				0.0109**			0.0108***			0.0009		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 7 - OLS regression results, dependent variable: investment in plant and equipment practices (moderator: MAS)

Variables	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.293**	7.750	0.000	**0.290**	7.71	0.000	**0.295**	7.840	0.000	**0.287**	7.570	0.000
International ownership	**0.065**	1.710	0.087	0.056	1.48	0.138	0.060	1.590	0.113	**0.065**	1.720	0.085
Age	**-0.136**	-3.710	0.000	**-0.132**	-3.59	0.000	**-0.129**	-3.530	0.000	**-0.125**	-3.420	0.001
Decoupling	-0.002	-0.040	0.966	-0.006	-0.15	0.878	-0.011	-0.290	0.769	-0.010	-0.260	0.796
Innovators				**0.142**	2.80	0.005	**0.108**	2.020	0.044	0.088	1.550	0.122
Marketeers				**0.120**	2.37	0.018	**0.114**	2.260	0.024	**0.095**	1.700	0.089
MAS							**-0.077**	-1.930	0.054	**-0.221**	-2.050	0.040
MAS x Innovators										0.151	1.610	0.108
MAS x Marketeers										0.032	0.550	0.581
Obs	661			661			661			661		
Prob > F	0.0000			0.0000			0.0000			0.0000		
R-squared	0.1187			0.1296			0.1346			0.1388		
Adj-r squared	0.1133			0.1216			0.1253			0.1268		
Δ R-squared				0.0109**			0.0049*			0.0042		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

2.4.2 Investments in quality practices

Results concerning the analysis carried out considering the investments in manufacturing quality practices as dependent variable are given in Tables 8-11; Statistical analysis prove support for what concern the contingent effect exerted by the cultural traits on the relationship between companies' priorities and the level of investment in quality practices applied by companies. Standardized beta coefficients are reported.

Surprisingly, the contingent effects are related only to innovators and there are not moderation effects for what concern the quality-oriented companies. In particular, the synergistic effects between the manufacturing strategic groups and cultural traits, highlight how innovators have invested more in quality practices in countries in which individualism-collectivism is low ($\beta_{IDV \times innovators}$= -0.180 p=0.005; Δ R-squared= 0.0093**) and both power distance ($\beta_{PDI \times innovators}$= 0.230; p=0.003; Δ R-squared= 0.0181***) and uncertainty avoidance are high ($\beta_{UAI \times innovators}$ = 0.121; p=0.063; Δ R-squared= 0.0152***); the Δ R-squared is significant, as shown in Table 8-10. The results will be discussed in the next section, in which further light on the statistical analysis will be provided.

Table 12 summarizes the statistical results, highlighting the significant moderation effects, both for what concern the level of the investments in manufacturing plant and equipment practices and in manufacturing quality practices. Results concerning innovators are reported in the upper part of the table, whilst results concerning marketeers in the bottom one.

Table 8 - OLS regression results, dependent variable: investment in quality practices (moderator: PDI)

Variables	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.382**	10.76	0.000	**0.381**	10.71	0.000	**0.347**	9.590	0.000	**0.351**	9.790	0.000
International ownership	**0.153**	4.290	0.000	**0.155**	4.35	0.000	**0.154**	4.380	0.000	**0.152**	4.340	0.000
Age	**-0.122**	-3.540	0.000	**-0.120**	-3.47	0.001	**-0.115**	-3.360	0.001	**-0.117**	-3.440	0.001
Decoupling	**-0.122**	-3.520	0.000	**-0.116**	-3.34	0.001	**-0.091**	-2.620	0.009	**-0.088**	-2.540	0.011
Innovators				-0.060	-1.26	0.207	-0.048	-1.020	0.309	-0.025	-0.540	0.593
Marketeers				0.003	0.06	0.952	-0.011	-0.240	0.813	0.008	0.160	0.873
PDI							**0.141**	3.890	0.000	-0.046	-0.490	0.624
PDI x Innovators										**0.230**	2.950	0.003
PDI x Marketeers										0.029	0.460	0.647
Obs	661			661			661			661		
Prob > F	0.0000			0.0000			0.0000			0.0000		
R-squared	0.2214			0.2253			0.2429			0.2610		
Adj-r squared	0.2167			0.2182			0.2347			0.2507		
Δ R-squared				0.0038			0.0176***			0.0181***		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 9 - OLS regression results, dependent variable: investment in quality practices (moderator: IDV)

Variables	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.382**	10.76	0.000	**0.381**	10.71	0.000	**0.320**	8.740	0.000	**0.315**	8.620	0.000
International ownership	**0.153**	4.290	0.000	**0.155**	4.35	0.000	**0.152**	4.340	0.000	**0.150**	4.330	0.000
Age	**-0.122**	-3.540	0.000	**-0.120**	-3.47	0.001	**-0.093**	-2.720	0.007	**-0.091**	-2.670	0.008
Decoupling	**-0.122**	-3.520	0.000	**-0.116**	-3.34	0.001	**-0.083**	-2.410	0.016	**-0.079**	-2.300	0.022
Innovators				-0.060	-1.26	0.207	-0.077	-1.630	0.104	-0.051	-1.070	0.286
Marketeers				0.003	0.06	0.952	-0.019	-0.400	0.692	0.003	0.070	0.943
IDV							**-0.196**	-5.360	0.000	-0.015	-0.180	0.858
IDV x Innovators										**-0.180**	-2.820	0.005
IDV x Marketeers										-0.103	-1.640	0.101
Obs	661			661			661			661		
Prob > F	0.0000			0.0000			0.0000			0.0000		
R-squared	0.2214			0.2253			0.2580			0.2673		
Adj-r squared	0.2167			0.2182			0.2500			0.2571		
Δ R-squared				0.0038			0.0327***			0.0093**		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 10 - OLS regression results, dependent variable: investment in quality practices (moderator: UAI)

Variables	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.382**	10.76	0.000	**0.381**	10.71	0.000	**0.381**	10.680	0.000	**0.385**	10.870	0.000
International ownership	**0.153**	4.290	0.000	**0.155**	4.35	0.000	**0.155**	4.280	0.000	**0.157**	4.360	0.000
Age	**-0.122**	-3.540	0.000	**-0.120**	-3.47	0.001	**-0.120**	-3.450	0.001	**-0.122**	-3.540	0.000
Decoupling	**-0.122**	-3.520	0.000	**-0.116**	-3.34	0.001	**-0.116**	-3.320	0.001	**-0.113**	-3.270	0.001
Innovators				-0.060	-1.26	0.207	-0.060	-1.250	0.210	-0.056	-1.170	0.241
Marketeers				0.003	0.06	0.952	0.003	0.060	0.952	0.001	0.030	0.976
UAI							0.001	0.020	0.987	-0.048	-0.590	0.557
UAI x Innovators										**0.121**	1.870	0.063
UAI x Marketeers										-0.057	-0.980	0.327
Obs	661			661			661			661		
Prob > F	0.0000			0.0000			0.0000			0.0000		
R-squared	0.2214			0.2253			0.2253			0.2405		
Adj-r squared	0.2167			0.2182			0.2170			0.2300		
Δ R-squared				0.0038			0.0000			0.0152***		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 11 - OLS regression results, dependent variable: investment in quality practices (moderator: MAS)

Variables	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.382**	10.760	0.000	**0.381**	10.71	0.000	**0.372**	10.560	0.000	**0.361**	10.200	0.000
International ownership	**0.153**	4.290	0.000	**0.155**	4.35	0.000	**0.148**	4.200	0.000	**0.157**	4.430	0.000
Age	**-0.122**	-3.540	0.000	**-0.120**	-3.47	0.001	**-0.124**	-3.620	0.000	**-0.120**	-3.500	0.000
Decoupling	**-0.122**	-3.520	0.000	**-0.116**	-3.34	0.001	**-0.107**	-3.100	0.002	**-0.105**	-3.070	0.002
Innovators				-0.060	-1.26	0.207	0.000	0.000	0.999	-0.005	-0.090	0.925
Marketeers				0.003	0.06	0.952	0.013	0.270	0.786	0.018	0.340	0.731
MAS							**0.137**	3.660	0.000	0.049	0.480	0.630
MAS x Innovators										0.119	1.370	0.173
MAS x Marketeers										-0.033	-0.600	0.546
Obs	661			661			661			661		
Prob > F	0.0000			0.0000			0.0000			0.0000		
R-squared	0.2214			0.2253			0.2408			0.2481		
Adj-r squared	0.2167			0.2182			0.2327			0.2377		
Δ R-squared				0.0038			0.0156***			0.0073**		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

2.5 DISCUSSION

Table 12 summarizes the results concerning the statistical analysis. As stated, the moderation effects exerted by cultural traits are reported, both for what concern innovators as well as marketeers. As we can see, empirical analyses provide evidence of how the national culture characteristics moderate the relationship between competitive priorities and the extent through which companies have invested in manufacturing practices.

Table 12 - Summary of statistical results

Moderation effects		
Manufacturing strategic group: Innovators		
National Culture	**Dependent variable: Manufacturing plant and equipment practices**	**Dependent variable: Quality practices**
Power distance	No moderation effect	Positive moderation effect
Individualism-collectivism	No moderation effect	Negative moderation effect
Uncertainty avoidance	No moderation effect	Positive moderation effect
Masculinity-Femininity	No moderation effect	No moderation effect
Manufacturing strategic group: Marketeers		
National Culture	**Dependent variable: Manufacturing plant and equipment practices**	**Dependent variable: Quality practices**
Power distance	No moderation effect	No moderation effect
Individualism-collectivism	Positive moderation effect	No moderation effect
Uncertainty avoidance	No moderation effect	No moderation effect
Masculinity-Femininity	No moderation effect	No moderation effect

First of all, an interesting contingent effect emerges when the investments in manufacturing quality practices are considered. In fact, as tables 8-10 show, individualism-collectivism as well as power distance and uncertainty avoidance moderate the extent through which innovators have invested in quality programmes. The synergist effects are statistical significant. Specifically, power distance and uncertainty avoidance (though weakly, sig.<0.10), positively moderate the degree through which innovators have invested in manufacturing quality practices whilst individualism-collectivism negatively moderates it. These results are intriguing.

Specifically, power distance and individualism-collectivism strongly moderate (sig.<0.01) the extent through which innovators have invested in quality practices. The Δ R-squared are significant, strengthening the contingent effect exerted by these cultural traits.

Previous research has shown how power distance and individualism-collectivism are inversely related. Societies that score high on individualism-collectivism exhibit lower power distance, and vice-versa (Hofstede, 1983a; 1983b; Flynn and Saladin, 2006). Consequently, individualism-collectivism and power distance can be taken together and analyzed into their horizontal and vertical dimension (Singelis et al., 1995; Trindias and Gelfand, 1998). Following this thought, a suggestion can be drawn: a society in which individuals perceive the hierarchy in societies and tend to act collectively, seeing the self as a part of a group, seems to be related to the way through which innovators have invested in quality programmes.

As previous works have shown (e.g., Flynn and Saladin, 2006), the ideal cultural profile about quality management encompasses high power distance and low individualism-collectivism as well as high uncertainty avoidance. Individualism-collectivism mirrors the people's goals orientation (Power et al., 2010): in this sense, an effective quality management encompasses a collective attitude. Similarly, power distance reflects the authority in the hierarchical levels: as Flynn and Saladin (2006) have suggested, manager in power distance culture rely more on formal methods in order to gather informations, since decisions are centralized and manager does not interact with the lower hierarchical level. Thereby, quality programmes might be fostered. Kull and Wacker (2010) have strengthened these suggestions, specifically focusing on uncertainty avoidance: these authors have argued how there is a positive relationship between the quality management effectiveness and the mentioned cultural trait. Uncertainty avoidance underlines the people's need for rules and standardized procedures, in order to strive with anxieties, ambiguities and risks; quality management is rooted on formal methods (e.g., statistical process control), as a consequence, uncertainty avoidance culture might adopt quality programmes in order to mitigate their anxiety and prevent unforeseen risks.

Combine findings, in a context in which individualism is low and both power distance and uncertainty avoidance are high, innovators have invested more in manufacturing quality practices: this result mirrors the suggestions traced in the mentioned studies. In this vein, innovators might have recognized these aspects and hence invested in manufacturing quality practices coherently with the cultural characteristics in which the plant is located, in order to maximize the effectiveness of their improvement programs and enhance customer satisfaction.

As wrote, is consistent with the "divergence" hypothesis. This academic thought claims that differences across organizations arise, since culture affects the people's behavior. According to this perspective, innovators might have invested in quality practices coherently to the cultural traits in which the plant is located, in order to be adherent to the companies' priorities, i.e. to be customer-oriented, and achieve, as a consequence, better performance in terms of customer satisfaction.

In this vein, the "congruence-fit" approach to the national culture characteristic, traced in Newman and Nollen (1996), is helpful. The congruence-fit approach to the national culture characteristics might explain why innovators companies have invested less in quality programmes in a more individualistic countries: this fact is consistent to the suggestion that

the effectiveness of quality programmes is negatively related to individualism-collectivism, as point out in previous studies (Anwar and Jabnoun 2006, Flynn and Saladin 2006; Power et al., 2010). An individualistic culture is less suitable to effectively adopt quality programmes rather than a collectivistic one. Further, quality programmes are "soft" investments (Wiengarten et al., 2011); thereby the cultural traits might become relevant especially for those companies that aim to be customer-oriented, since they are strictly tied with the way through which people act. Moreover, cultural traits might bring with them some issues that in a global context can inhibit the competitiveness of companies. For instance, invest in quality practices might be a strategy carried out with the aim to reduce the issues concerning a highly centralized power, flattening the managerial levels. This suggestion might explain why innovators in power distance culture have invested more in these programmes. Similarly, quality practices might compensate the lack of clarity that a high uncertainty avoidance environment involves (Flynn and Saladin, 2006; Kull and Wacker, 2010 Wiengarten et al., 2011). This suggestion might shed a light on the fact that uncertainty avoidance positively moderates the level of the investment in quality practices carried out by innovators.

These hints are consistent with the "compensation mechanism", traced in Vecchi and Brennan (2011). According to this thought, companies might have invested in manufacturing practices in the extent through which the effects exerted by the national culture characteristics might be mitigated. As a consequence, companies might achieve better results, in terms of operational outcomes and customer satisfaction.

Conversely, when the investments in manufacturing plant and equipment practices are taken into account, the contingent effect exerted by cultural traits are limited to marketeers and to individualism-collectivism. More specifically, Table 5 shows how individualism-collectivism positively moderates the level of the investment in manufacturing plant and equipment practices, carried out by marketeers. The result, through weak (sig.<0.10), is consistent to what previously stated. In a highly individualistic environment, marketeers have invested more in manufacturing plant and equipment practices since these type of programmes might be more effective. The "congruence-fit" to the national culture characteristics approach might be useful: these investments might be more adherent within an individualistic environment and, therefore, more effectively in assist companies to achieve a sustainable competitive advantage.

2.6 CONCLUSION

This research can help managers to recognize the relevance of the national culture characteristics when define companies' priorities and decide how to compete in the market. Starting from the research proposition, a suggestion can be drawn: *the way through which companies have invested in manufacturing practices, changes according to the cultural characteristics of the countries in which companies are operating.*

Indeed, an effective managerial decision cannot be undertaken without taking into account the culture of the countries in which companies are operating. National culture affects the way through which people act and directly or indirectly, the decision-making process, the emphasis through which the investments are put in place and the achievement of the goals.

The article has shown how national culture moderates the way through which companies have carried-out their investments in manufacturing practices, coherently with their priorities. Specifically, companies define how to compete and thus invest in manufacturing practices with the purpose to effectively compete in the market. However, this relation is not straightforward: the cultural characteristics should be taken into account, and managers must be aware that the investments in manufacturing practices should be adherent to the cultural characteristics and can be, at the same time, helpful to cope with the societies' cultural peculiarities, in order to enhance companies' performance.

The research suggests that more companies aim to be innovators, i.e. customer oriented, the more the national culture characteristic should be taken into account, especially for what concern the investments in quality programmes. Our results contribute to strengthen the importance of national culture: managers need to be conscious of this aspect in order to invest in an effective way and be adherent with the achievement of the companies' goals. We argue that this article contributes to the research stream of manufacturing practices, by providing empirical evidence of the complex relationship between competitive priorities and manufacturing "best" practices, and by highlighting the specific role of culture in moderating this relationship. From a managerial point of view, the article provides clear indications of those elements to which companies should pay attention when investing globally on manufacturing practices.

The research is not exempt from limitations. First of all, besides being wide in terms of national coverage, the data adopted doesn't allow us to understand the specific decision making that companies in different cultures adopt, when deciding how to invest in

manufacturing. Future studies could provide interesting insights, by focusing specifically on this issue. Further, as previous works based on similar dataset have indicated (e.g., Wiengarten et al., 2011; Wiengarten et al., 2012) the Global Manufacturing Research Group database uses a single respondent, and analysis are based on cross-sectional data. The last issue is advanced since cross-sectional data might create difficulties in understanding causation.

APPENDIX A. CORRELATION ANALYSIS

Correlations matrix (* Sig <0.05;** Sig<0.01)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1												
2	**0.24****	1											
3	-0.01	-0.03	1										
4	0.05	0.06	-0.02	1									
5	-0.01	0.04	0.03	0.09*	1								
6	0.05	0.03	-0.07	-0.07	**-0.69****	1							
7	-0.05	**-0.09***	0.05	-0.04	**-0.49****	**-0.29****	1						
8	**0.31****	**0.14****	**-0.14****	0.02	0.05	0.05	**-0.13****	1					
9	**0.41****	**0.24****	**-0.13****	-0.09*	-0.07	0.09*	-0.01	**0.50****	1				
10	**0.24****	0.05	-0.04	**-0.18****	**-0.17****	**0.19****	0.01	0.01	**0.26****	1			
11	**-0.31****	**-0.09***	**0.14****	**0.15****	0.01	-0.09*	0.09*	**-0.21****	**-0.34****	**-0.68****	1		
12	0.07	0.04	0.02	-0.10*	**-0.39****	**0.24****	**0.23****	-0.07	**0.18****	**0.31****	0.09*	1	
13	**-0.13****	**-0.22****	**0.11****	**-0.13****	**-0.12****	0.05	0.10*	**-0.17****	-0.07	**0.28****	-0.05	**0.29****	1

Firm's size (1), international ownership (2), Age plant's equipment (3), Decoupling point (4), Innovators (5), Marketeers (6), Caretakers (7), Manufacturing plant and equipment practices (8), Quality practices (9), PDI (10), IDV (11), MAS (12), UAI(13)

CHAPTER THREE.
Supply chain information integration in OECD economies: the role of culture

3.1 INTRODUCTION

Twentieth century has brought with it a profound changed in the economical environment. The borders of countries have been overcome and market competition has begun to lasts for twenty-four a day around the world. As a consequence, companies have started to deal with a more demanding customers and uncertainties are increased. This has led that traditional approaches such as arm-length relationship has begun no longer effective to compete; thus, manufacturers have started to strategically interact with their supply chain partners to effectively meet market requirements, leading to integrated supply chains (Flynn et al., 2010; Frohlich and Westbrook, 2001; Zhao et al., 2008) where integration can be seen as the evolution of approaches such as customer-supplier partnership (e.g., Lamming, 1993), in which each supply chain partner contributes to enhance the overall supply chain performance (Yeung et al., 2009).

Although several studies have argued the relevance of supply chain integration (SCI) to build a competitive advantage (e.g., Flynn et al., 2010; Frohlich and Westbrook, 2001) some authors (e.g., Zhao et al., 2008; Yeung et al., 2009) have suggested how the understanding of its enablers and antecedents is still scarcely investigated. The question that has arisen is "how" a company integrates their activities, and what are the factors that might foster it. In a perspective in which competitive pressure has brought to global supply chains, this understanding is relevant since managerial issues that inhibit integration, such as coordination of resources, flows, information and materials as well as the managing of risks, uncertainties and relationship along the several supply chains partners are amplified in a global context.

At the same time, differences in cultural characteristics (Meixell and Gargeya, 2005) might increase the mentioned issues; indeed, culture affects the way through which people act when engaging in a business relationship (e.g., Griffith and Myers, 2005). It follows, that operational management decisions cannot be undertaken disregarding the culture of the country in which a company is operating (Prasad and Babbar, 2000; Pagell et al., 2005). Further, in global supply chains, the mentioned suggestion becomes relevant: as Flynn et al.

(2010, p. 67) have noted, national culture might indeed affect the extent through which companies integrated their activities.

Literature agrees in considering SCI through the perspectives of supplier integration, customer integration and internal integration (e.g., Flynn et al., 2010). A manufacturer can integrates its processes, practices and activities either internally and externally. As previous scholars have noted (e.g., Frohlich and Westbrook, 2001; Yeung et al., 2009), integration can be achieved through investments in information sharing and system coupling, where information sharing reflects the exchange of informations about production plans, inventories level and market demand between a manufacturer and its supply chain partners whilst system coupling the joint investments that customers and suppliers carried out to coordinate their physical activities (e.g., just in time, vendor managed inventory, collaborative planning forecasting and replenishment) and achieve, as a result, a faster flows of products with less inventory levels along the supply chain (Power et al., 2005).

Acknowledging the abovementioned suggestions, this article aims to assess the role exerted by cultural values on the willingness of a company to invest in information sharing, either with its suppliers and customers. Specifically, the cultural characteristics of individualism-collectivism and power distance shall be considered. Each of them, reflects a nuanced that is relevant to establish a long-term relationship such as supply chain integration: these aspects are how people engage in a relationship and how people perceive power and authority. Zhao et al. (2008) have considered both these characteristics in their study about integration between manufacturer and customer, arguing their findings in the light of the Chinese's cultural environment.

Starting from the above considerations, the aim of the article is twofold. First of all, to assess the role of national culture in enabling a manufacturer to invest in information sharing both with its customers and suppliers. The role of culture has been assessed by considering those manufacturers whose plants are located in a OECD - Organization for Economic Cooperation and Development-economy. Firstly, this choice allow us to deeply focus on a specific environment by considering the OECD market economies and, secondly, restrict the domain of the research to OECD members, might help to reduce issues related to differences in economic development, enhancing the role of the cultural characteristics in explain the level of the investments in information sharing. The article aims to contribute to the research strand of global supply chain, shedding further light on the antecedents that might foster or hinder an effective SCI. Drawing upon to Hofstede's taxonomy (1980), individualism-

collectivism and power distance will be the cultural traits taken into account throughout the research. These dimensions are inversely related, due to the effect of the country's wealth. It follows that throughout the research these constructs will be considered also together, under the common concept of vertical collectivism (Singelis et al., 1995).

The study is structured as follows: initially, a detailed literature review regarding SCI, information sharing and national culture will allow us to establish the research hypotheses. Then, we turn our attention on the empirical methodology. Afterwards, research hints will be provided as well as the theoretical and managerial implications. Lastly, conclusions and opportunities for future research will be drawn.

3.2 LITERATURE AND RESEARCH HYPOTHESIS

3.2.1 Supply chain integration

Supply chain integration is an holistic concept that encompasses ongoing collaboration, commitment, mutual trust, sharing of risks, information, money and rewards as well as administrative tasks along a manufacturer and its customers and suppliers (Flynn et al., 2010). In search of a definition, and with the aim to clarify the central terms of this research, Zhao et al. (2008, p. 374) have defined SCI as "the degree to which a firm can strategically collaborate with its supply chain partners and collaboratively manage the intra- and inter-organization processes to achieve effective and efficient flows of product and services, information, money and decisions with the objective of providing maximum value to customers at low cost and high speed"; this definition has been further validated and embraced in other studies (e.g., Yeung et al., 2009; Flynn et al., 2010) since it reflects the holistic nature of supply chain integration; a construct that underlines both social ties facilitating collaboration and negotiation (see, Yeung et al., 2009) as well the willingness to invest in a long-term relationship, both from a relational and technological perspective (Wiengarten et al., 2013) with the aim to provide value to customers.

Although SCI is still an emerging area of research (Flynn et al., 2010), several studies have suggested its importance in achieve a competitive advantage and in improve performance (Frohlich and Westbrook, 2001; Vickery et al., 2003; Zhao et al., 2008), as well as its relevance in preventing issues such as the well-know bullwhip effect (Lee et al., 1997). In this regard, literature has considered supply chain integration through two main areas of application named, *technological collaboration*, that reflects joint efforts made in product

development (Dowlatshahi, 1998; Hartley et al., 1997; Petersen et al., 2006; He et al., 2013) and *operational collaboration*, that mirrors the integration in the production-logistics processes (Cagliano et al., 2006; Frohlich and Westbrook, 2001).

A manufacturer can integrates its activities either internally, externally or both, reflecting the multidimensionality of SCI (see, Flynn et al., 2010; Wong et al., 2011). Internal integration is achieved when initiatives and programmes are carried out internally the manufacturer, whilst external integration when a manufacturer coordinates activities with either its customers, suppliers or both; supplier integration is built when a focal company collaborates with its supplier by sharing with them information about market demand and production plans (Wong et al., 2011); similarly customer integration encompasses a joint activities between a focal companies and its customers, with the aim to anticipate market requirements and "matching supply with demand" (Wong et al., 2011, p.605). More broadly, Flynn et al. (2010, p.59), relying on Stank et al. (2001), define external integration as the "degree to which a manufacturer partners with its external partners to structure inter-organizational strategies, practices and processes into collaborative, synchronized processes", whilst internal integration as "the degree to which a manufacturer structures its own organizational strategies, practices and process into collaborative, synchronized process, in order to fulfill its customers' requirements". This article focuses on external integration, by considering how a focal company share information either with its customers and suppliers. Therefore, in the next section, a review concerning information sharing will be provided.

3.2.2 Information sharing

Information sharing, alongside collaborative planning (Cai et al., 2009), has been recognized as an activity through which a focal company can achieve integration about information with either its customers and suppliers. From a SCI perspective, information sharing is a theme through which integration can arise (Cagliano et al., 2006; Yeung et al., 2009; Frohlich and Westbrook, 2001); more specifically, through information sharing, the coordination of the supply chain, as well as its planning, can be enhanced (e.g., Welker et al., 2008).

In the detail, information sharing refers to the exchange of information between a focal company and its supply chain partners, concerning issues such as production plans, inventories level and market demand. According to Yeung et al. (2009, p.67), information sharing can be defined as "the degree to which a firm can coordinate the activities of

information sharing, and combine core elements from heterogeneous data management systems, content management systems, data warehouses, and other enterprise applications into a common platform, in order to substantiate integrative supply chain strategies"; a definition that underlines either the technological and managerial issues that might hinder an effective implementation of the considered activity. Information sharing requires, besides the willingness to exchange, receive and manage data (Van der Vaart et al., 2012), standardized supply chain practices (Zhou and Benton, 2007) as well as the physical integration, for what concern ICT, between a focal company and its supply chain partners, resulting beneficial in reducing issues, such as the bullwhip effect (e.g., Lee, 1997; Lee and Whang, 2000), only when the coordination of all decisions and activities is achieved (Yeung et al., 2009).

Gunasekaran and Ngai (2005), as well as Lee and Wang (2000), have addressed the theme of information sharing in a perspective of global supply chain. Specifically, Gunasekaran and Ngai (2005) have argued the role of information sharing in managing uncertainties, concerning the so-called build-to-order supply chain. Lee and Wang (2000), after having listed the types of information sharing (e.g., inventory level, sales data, tracking/tracing, sales forecast and production delivery schedule), have suggested how several hurdles might inhibit the effectiveness of the information sharing programmes: among them, the "trust" that should exist among the several supply chain partners is the foremost. This issue, has been considered in previous research both concerning information sharing as well as SCI as a whole (e.g., Zhao et al., 2008; Cai et al., 2009; Yeung et al., 2009).

3.2.3 Supply chain integration and national culture

Although recently, research on supply chain integration has begun to pay attention to the role of cultural values, either as an enabler of integration as well as in relation with supply chain performance (e.g., Zhao et al., 2006; Zhao et al., 2008; Cannon et al., 2010; Cai et al., 2010). In this regard, considering a global supply chain perspective, Griffith and Myers (2005) have argued how cultural values might address people's behavior that in turn might affect how practices are applied and businesses are managed, a suggestion that is traceable in other authors (e.g., Cannon et al., 2010; Naor et al., 2010). Moreover, in a similar vein, Chen et al. (1998) as well as Huff and Kelley (2003) have indentified how cultural traits might influence the way through which people tend to cooperate with each other, straightening the above suggestion.

From a supply chain point of view, by considering buyer-supplier relationship, Cannon et al. (2010) have noted how cultural differences might undermine aspects such as trust, commitment and long-term orientation and how "cultural differences may well present challenges to the health of these relationship" (Cannon et al., 2010, p. 506). In line with this, these authors have assessed how cultural differences might change the level of buyer's long term orientation, when buyer's trust and supplier performance have been considered as antecedents. In a similar vein, Zhao et al. (2008) have considered culture as an enabler of SCI, paying attention to the integration between customers and manufacturers. These authors have shown how two aspect strictly tied to SCI, i.e. power, defined, according to Yeung et al. (2009, p. 69), as " the member's ability to influence the behavior and decision of other members" and relationship commitment, i.e. the willingness of members to invest resources in a long-term relationship (Zhao et al., 2008) can be explained considering the Chinese's cultural environment. Griffith and Myers (2005), taking into account the governance strategies across companies in a global supply chain (e.g., information exchange, flexibility and solidarity), have compared a sample of US and Japanese companies, with the aim to understand if the fit between the mentioned governance strategies and the expectation of the several supply chain members, arising from their cultural values, improves company performance.

Although it has been considered, the mentioned studies have not assessed culture in a direct way: specifically, cultural values have been used since they underline more nuanced concepts, such as trust, power and commitment (e.g., Zhao et al., 2008). However, these researchers have shown how cultural values might influence SCI, since integration imply collaboration, sharing of risks and rewards as well as mutual trust and social ties. This article, aims to assess cultural differences in terms of the level of the investments in information sharing activities, considering cultural values directly, relying on the Hofstede (1980)'s dimensions of individualism-collectivism and power distance, two cultural traits that might reflect, respectively, how people engage in a relationship and how people perceive power and authority. This suggestion is traceable in Zhao et al. (2008). Therefore, the next section reviews the meaning of the mentioned cultural traits, and establishes the research hypothesis.

3.2.4 Individualism-collectivism

In the field of manufacturing and supply chain management, individualism-collectivism has been seen as a construct able to explain differences in cross-cultural behavior (e.g., Power

et al., 2010; Cannon et al., 2010). Hofstede (1991) defines individualism (IDV) as "a preference for loosely-knit social framework in which individuals are expected to take care of themselves and their immediate families only" whilst collectivism as "a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty". More specifically, people in individualistic culture tend to act accordingly to their own interests rather than the society's goals. Conversely, people in a more collectivistic culture place the society's interest above their own. According to Power et al. (2010), the mentioned attitudes underline the people's goals orientation in performing tasks. The same suggestion, is traceable in Doney et al. (1998, p. 608) according to which "individualism-collectivism reflects the way people interact, such as the importance of unilateral versus group goals, the strength of interpersonal ties, respect for individual accomplishment, and tolerance for individual opinion". Therefore, according to Cannon et al. (2010), people in individualistic culture will be more autonomous and more self-confident; conversely, people in a collectivistic culture will be more interdependent reflecting how the mentioned cultural trait, might affect the way through which people establish and sustain their relationships, an aspect that can be crucial in the light of information sharing integration activities. According to Zhao et al. (2008), a collectivistic culture, such as China, might be more suitable to engage in a type of relationship that underlines mutual trust and long-term orientation (i.e. normative relationship), such as supply chain integration requires. Therefore, we posits:

Hp1: A manufacturer located in an individualistic culture will be less willing to share information with its customers and suppliers.

3.2.5 Power distance

Strictly tied with individualism-collectivism, with which has a significant negative correlation due to the national wealth (Hofstede, 1983), the cultural trait of power distance (PDI) "expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally" (Hofstede, 1991). More specifically, power distance reflects how people is comfortable with decisions taken from the most powerful members in a society (e.g., Zhao et al., 2008). Further, in a high power distance culture, authority is centralized. It follows, that a manufacturer located in an high PDI culture might be more amenable with regards to the sources of power, such as a customer. At the same time, following the Zhao et al. (2008)'s suggestion, a manufacturer in a high power distance

culture, such as China, alongside the acceptance of sources of power that underline coercion and reward, might perceive significantly sources of power that are based on the recognition of knowledge, reputation and legitimacy (i.e. expert power, referent power and legitimate power). Therefore, we posits:

Hp2: A manufacturer located in an high power distance culture will be more willing to share information with its customers and suppliers.

3.2.6 Vertical collectivism-horizontal individualism

As noted in the previous section, individualism-collectivism and power distance are inversely related, due to the country's wealth (Hofstede, 1983). It means, that a more individualistic society is characterized by lower power distance, and vice-versa. It follows, that individualism-collectivism and power distance can be taken together, and analyzed into their vertical and horizontal dimensions. According to Singelis et al. (1995, p. 244), vertical collectivism, i.e. a cultural pattern in which power distance is high and individualism-collectivism is low, reflects a society in which an individual tend to see themselves "as an aspect of an group, but the members of the in-group are different from each other". Conversely, its counterpart, horizontal individualism, is a cultural pattern characterized by more autonomous people, in which people "want to be unique" (Flynn and Saladin, 2006). Relying on the abovementioned suggestions, we posits:

Hp3: A manufacturer located in a vertical collectivistic culture will be more willing to share information with its customers and suppliers.

3.3 RESEARCH METHODOLOGY

3.3.1 Sample description and data collection

The research hypothesis are tested relying on data gathered throughout the fifth edition of the International Manufacturing Strategy Survey (IMSS V), carried out in 2009. Originally launched by London Business School and Chalmers University of Technology, this project studies manufacturing and supply chain strategies within assembly industry (ISIC 28-35 classification), through a detailed questionnaire administered simultaneously in different countries, by local research groups. Responses are gathered in a unique database (Lindeberg et al., 1998), which is available only to those who have actively participated in the data collection process.

The basic structure of the questionnaire is as follows: the first section of the questionnaire pertains to the business unit, in order to gather general information (e.g., company size, industry, production network configuration, competitive strategy and business performance) on the context in which manufacturing takes place, whereas the other sections refer to the plant's dominant activity, focusing on manufacturing strategies, practices and performance. Dominant activity is defined as the most important activity, which best represents the plant. The plant is chosen as the unit of analysis in order to avoid problems related to business units with multiple plants operating in different ways.

In each edition, the questionnaire is partially redesigned in order to ensure alignment with the most recent research goals. This update is carried out by a design team composed of a pool of international researchers and, thus, avoids the researchers' country-biases (Van de Vijver and Leung, 1997). Data in each country are gathered in the country's native language and the questionnaire is translated and back-translated to check for consistency (Behling and Law, 2000). Companies are selected from a convenience sample or randomly selected from economic datasets and then the operations, production or plant managers are contacted and asked to assist in the research. If the respondent agrees, the questionnaire is sent and, where appropriate, a reminder is sent after a few weeks. Questionnaires that are sent back are controlled for missing data, typically handled on a case-by-case basis by directly contacting the company again. Every country then controls the gathered data for late respondent bias by company size and industry. The overall response rate is 18.3% of the questionnaires sent (10.6% of the contacted companies).

The sample is limited to those companies whose answers were valid for our analysis and to those countries for which the Hofstede's indexes are available. Further, we drop cases declaring to have less than twenty employees or more than 16,000 and cases not providing the ISIC code classification. Lastly, our analysis is limited to those countries belonging to an OECD economy. Therefore, 379 companies (from the 729 of the overall dataset) belonging to 17 countries were used in the analysis. Table 1 shows the sample description, whilst Table 2 the Hofstede's scores of individualism-collectivism and power distance.

Table 1- Sample description

Country	N	%	Country	N	%	Country	N	%	ISIC** code (Rev. 3.1)	N	%	Size *	N	%
Belgium	13	3.4%	Japan	14	3.7%	USA	31	8.2%	28	137	35%	Small	213	56.2%
Canada	14	3.7%	Korea	15	4.0%				29	107	28%	Medium	71	18.7%
Denmark	12	3.2%	Mexico	10	2.6%				30	2	1%	Large	95	25.1%
Estonia	23	6.1%	Netherland	37	9.8%				31	53	14%			
Germany	29	7.7%	Portugal	8	2.1%				32	20	5%			
Hungary	61	16.1%	Spain	31	8.2%				33	22	6%			
Ireland	4	1.1%	Switzerland	26	6.9%				34	29	8%			
Italy	40	10.6%	UK	11	2.9%				35	0				

Sample Size: 379 * Size: Small: less than 250 employees Medium: 251-500 employees Large: over 501 employees

**ISIC Code (Rev. 3.1). 28: Manufacture of fabricated metal products, except machinery and equipment; 29: Manufacture of machinery and equipment not classified elsewhere; 30: Manufacture of office, accounting and computing machinery; 31: Manufacture of electrical machinery and apparatus not classified elsewhere; 32: Manufacture of radio, television and communication equipment and apparatus; 33 Manufacture of medical, precision and optical instruments, watches and clocks; 34: Manufacture of motor vehicles, trailers and semi-trailers; 35:Manufacture of other transport equipment.

Table 2- Hofstede's score of Individualism-collectivism and Power distance

Country	IDV	PDI	Country	IDV	PDI	Country	IDV	PDI
Belgium	75	65	Japan	46	54	USA	91	40
Canada	80	39	Korea	18	60			
Denmark	74	18	Mexico	30	81			
Estonia	60	40	Netherland	80	38			
Germany	67	35	Portugal	27	63			
Hungary	80	46	Spain	51	57			
Ireland	70	28	Switzerland	68	34			
Italy	76	50	UK	89	35			

3.3.2 Measures

Consistently with previous literature (Cagliano et al., 2003; Frohlich and Westbrook, 2001), information sharing integration is assessed through a set of supply chain management practices. Specifically, we have asked to respondents to indicate the extent through which production planning decisions, as well as flows of goods, are coordinated both with their customers and suppliers. Measuring are assessed through a Likert-scale ranging from "none" (value=1) to high (value=5). An explanatory factor analysis has been carried out in order to built a multi-item measure, which reflects the extent through which a focal companies have invested in information sharing activities, both with its customers and suppliers. Table 3 summarizes the explanatory factor analysis. Factor loads are all above the 0.4 threshold (Nunally and Bernstein, 1994) and Cronbach's alpha exceed 0.6 for each construct, indicating reliability of the scales (Nunally and Bernstein, 1994). Kaiser-Meyer-Olkin test proves further support for the factors reliability. Therefore two latent factors, named "information sharing-

suppliers" and "information sharing-customers" have been built by averaging the items that constitute them.

Further, in order to classified countries, according to their degree of individualism-collectivism and power distance, a cluster analysis has been made; results are shown in Table 4. The number of companies located in vertical collectivistic countries is reported (n=78) as well as in horizontal individualistic ones (n=301). Further, for each cultural group, the mean value of the cultural traits of individualism-collectivism (IDV) and power distance (PDI) is highlighted. In order to perform statistical analysis, a dummy variable has been created with the aim to take into account companies belonging to a country characterized by a vertical collectivistic cultural orientation.

3.3.3 Control variables

A set of control variables have been added: consistently with previous literature (Power et al., 2010; Boyer and Pagell, 2000) we controlled for company's size (measured through the logarithm of the total number of employees) and for company's process choice. Specifically, company's process choice is assessed by asking to respondents to indicate the percentage of customer orders processed as engineering to order, made to order, assemble to order and made to stock. An index, defined as a weighted average, has been built in order to take into account the companies' propensity to "produce to stock" Given this, we defined decoupling point as follows: Decoupling point=(1*ETO+2*MTO+3*ATO+4*MTS-100)/300. According to Welcker et al. (2008), decoupling point reflects a proxy of the business condition in which a manufacturer operates: a propensity to be "engineered to order" might underline a more uncertain environment. Further, a dummy variable, named "home-country" has been used in order to take into account if the focal company is located in the same country of the company's headquarters. With the aim to capture the internationalization degree of the focal companies, the percentage of supplier inside the same country has been added. This variable is been named "local sourcing". Moreover, the position of the focal company in the supply chain is considered by asking to respondents to indicate the percentage of sales to end-users (Wiengarten et al., 2013). Lastly, two more control variables have been considered: demand variability and the degree of people autonomy in performing tasks. The first one, can been considered as a proxy of market uncertainties, whilst the second one as a proxy of the organizational culture within focal company. The next section, shows the results concerning the OLS analysis carried out in order to test our research hypothesis.

Table 3 - Explanatory Factor Analysis

Loading	Information sharing-suppliers	Loading	Information sharing-customers
0.7562	Share inventory level	0.7764	Share inventory level
0.8000	Share production planning/ forecast	0.8211	Share production planning/ forecast
0.7087	Order tracking/tracing	0.7791	Order tracking/tracing
0.7086	Agreement on delivery frequency	0.7942	Agreement on delivery frequency
KMO	0.725	KMO	0.738
Bartlett test	Chi-Squared 310.096	Bartlett test	Chi-Squared 483.210
Cronbach's alpha	0.7293	Cronbach's alpha	0.8021
Eigenvalue	2.2161	Eigenvalue	2.5147
Variance explained	0.5540	Variance explained	0.6287

Table 4 - Cluster analysis, cultural orientation

	Vertical collectivism	Horizontal individualism
Cultural orientation	**1 (n=78)**	**2 (n=301)**
PDI Mean	60.73	30.60
IDV Mean	41.11	**76.52**

3.4 EMPIRICAL ANALYSIS

In order to assess the abovementioned research hypothesis, we used a set of multiple regression analysis in which the latent factors, underline the investments in information sharing carried out by a focal company with its customers and suppliers, are the dependent variables. Hierarchical approach (Wampold and Freud, 1987) has been applied in order to understand if the adding of variables contributes to increase significantly the percentage of variance explained. Initially, the effects of control variables on the dependent ones have been tested. Afterwards, we ran a further regression model in order to assess the effects of cultural traits. Correlation matrix is shown in appendix. We controlled each step of the procedure by evaluating the variance inflation factor and the condition indexes. The highest mean variance inflation factor is 1.07 on a cut-off point between 5 and 10 (Hair et al., 1998; Menard, 2002; Neter et al., 1989) whereas the highest condition index is 3.14 (Belsey et al. 2004). Therefore, multicollinearity is not considered an issue for any model.

3.4.1 Information sharing-suppliers

Results concerning the analysis carried out considering the investments in information sharing applied by a focal company with its suppliers as dependent variable are given in Tables 5-7; standardized beta coefficients are reported. Statistical analysis show how either power distance and individualism-collectivism as well as the vertical collectivistic cultural

orientation of the country in which the plant is located, impact the extent through which a focal company has invested in information sharing with its suppliers. These results will be later discussed.

3.4.2 Information sharing-customers

Results concerning the analysis carried out considering the investments in information sharing applied by a focal company with its customers as dependent variable are given in Tables 8-10; standardized beta coefficients are reported. Statistical analysis show how power distance as well as the vertical collectivistic cultural orientation of the country in which the plant is located, impact the extent through which a focal company has invested in information sharing with its customers. Surprisingly, individualism-collectivism doesn't show statistical significance. These results will be later discussed.

Table 5 - OLS regression results, dependent variable: information sharing-suppliers (PDI)

Information sharing- Suppliers	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.15**	2.95	0.00	**0.15**	2.87	0.00
Subsidiary	-0.05	-0.87	0.39	-0.05	-0.95	0.34
Demand variability	**0.10**	2.07	0.04	**0.09**	1.89	0.06
Local sourcing	**-0.09**	-1.68	0.09	-0.09	-1.64	0.10
Supply chain position	-0.04	-0.88	0.38	-0.04	-0.88	0.38
Decoupling point	0.02	0.47	0.64	0.02	0.45	0.65
People's autonomy	-0.05	-0.91	0.36	-0.04	-0.79	0.43
Power distance				**0.18**	3.64	0.00
Obs	379			379		
Prob > F	0.00			0.00		
R-squared	0.06			0.09		
Adj-r squared	0.04			0.07		
Δ R-squared				0.0324***		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 6 - OLS regression results, dependent variable: information sharing-suppliers (IDV)

Information sharing- Suppliers	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	**0.15**	2.95	0.00	**0.15**	2.88	0.00
Subsidiary	-0.05	-0.87	0.39	-0.06	-1.05	0.29
Demand variability	**0.10**	2.07	0.04	**0.10**	2.00	0.05
Local sourcing	**-0.09**	-1.68	0.09	**-0.09**	-1.69	0.09
Supply chain position	-0.04	-0.88	0.38	-0.04	-0.78	0.44
Decoupling point	0.02	0.47	0.64	0.02	0.46	0.65
People's autonomy	-0.05	-0.91	0.36	-0.05	-1.02	0.31
Individualism-collectivism				**-0.13**	-2.56	0.01
Obs	379			379		
Prob > F	0.00			0.00		
R-squared	0.06			0.08		
Adj-r squared	0.04			0.06		
Δ R-squared				0.0163**		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 7 - OLS regression results, dependent variable: information sharing-suppliers (vertical collectivism)

Information sharing- Suppliers	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	0.15	2.95	0.00	0.14	2.70	0.01
Subsidiary	-0.05	-0.87	0.39	-0.05	-1.02	0.31
Demand variability	0.10	2.07	0.04	0.09	1.80	0.07
Local sourcing	-0.09	-1.68	0.09	-0.10	-1.97	0.05
Supply chain position	-0.04	-0.88	0.38	-0.05	-0.98	0.33
Decoupling point	0.02	0.47	0.64	0.01	0.15	0.88
People's autonomy	-0.05	-0.91	0.36	-0.05	-0.91	0.36
Vertical collectivism				**0.20**	4.07	0.00
Obs	379			379		
Prob > F	0.00			0.00		
R-squared	0.06			0.10		
Adj-r squared	0.04			0.08		
Δ R-squared				0.0402***		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 8 - OLS regression results, dependent variable: information sharing-customers (PDI)

Information sharing- Customers	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	0.02	0.44	0.66	0.02	0.36	0.72
Subsidiary	-0.02	-0.45	0.65	-0.03	-0.50	0.62
Demand variability	**0.11**	2.18	0.03	**0.10**	2.05	0.04
Local sourcing	**-0.11**	-2.06	0.04	**-0.11**	-2.02	0.04
Supply chain position	**-0.25**	-4.97	0.00	**-0.25**	-4.99	0.00
Decoupling point	0.03	0.50	0.62	0.02	0.49	0.63
People's autonomy	-0.06	-1.24	0.22	-0.06	-1.16	0.25
Power distance				**0.12**	2.47	0.01
Obs	379			379		
Prob > F	0.00			0.00		
R-squared	0.11			0.12		
Adj-r squared	0.09			0.10		
Δ R-squared				0.0145**		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 9 - OLS regression results, dependent variable: information sharing-customers (IDV)

Information sharing- Customers	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	0.02	0.44	0.66	0.02	0.39	0.70
Subsidiary	-0.02	-0.45	0.65	-0.03	-0.55	0.58
Demand variability	**0.11**	2.18	0.03	**0.11**	2.14	0.03
Local sourcing	**-0.11**	-2.06	0.04	**-0.11**	-2.06	0.04
Supply chain position	**-0.25**	-4.97	0.00	**-0.25**	-4.92	0.00
Decoupling point	0.03	0.50	0.62	0.03	0.49	0.62
People's autonomy	-0.06	-1.24	0.22	-0.06	-1.30	0.20
Individualism-collectivism				-0.07	-1.46	0.14
Obs	379			379		
Prob > F	0.00			0.00		
R-squared	0.11			0.11		
Adj-r squared	0.09			0.09		
Δ R-squared				0.01		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 10 - OLS regression results, dependent variable: information sharing-customers (Vertical collectivism)

Information sharing- Customers	**β**	**t**	**P>t**	**β**	**t**	**P>t**
Plant size	0.02	0.44	0.66	0.01	0.26	0.80
Subsidiary	-0.02	-0.45	0.65	-0.03	-0.54	0.59
Demand variability	**0.11**	2.18	0.03	**0.10**	2.00	0.05
Local sourcing	**-0.11**	-2.06	0.04	**-0.12**	-2.23	0.03
Supply chain position	**-0.25**	-4.97	0.00	**-0.25**	-5.06	0.00
Decoupling point	0.03	0.50	0.62	0.02	0.30	0.76
People's autonomy	-0.06	-1.24	0.22	-0.06	-1.23	0.22
Vertical collectivism				**0.12**	2.49	0.01
Obs	379			379		
Prob > F	0.00			0.00		
R-squared	0.11			0.12		
Adj-r squared	0.09			0.10		
Δ R-squared				0.0147**		

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

3.5 DISCUSSION

Although previous research on SCI have highlighted that integration improves performance (e.g., Frohlich and Westbrook, 2001; Vickery et al., 2003), the understanding of its enablers and antecedents is still scarcely investigated (Zhao et al., 2008). Starting from this latter consideration, statistical analysis prove how cultural values impact the level of the investments in information sharing activities, as summarized in Table 11.

Table 11- Summary of statistical results

National Culture	Dependent variable: Information sharing- suppliers	Dependent variable: Information sharing-customers
Power distance	Positive effect	Positive effect
Individualism-collectivism	Negative effect	No effect
Vertical collectivism	Positive effect	Positive effect

Specifically, power distance shows a strong statistical significance for what concern the level of investments that a manufacturer has applied both with its suppliers and customers, proving support for Hp2. In this regard, Table 5 shows how in a high power distance culture a focal company has invested more in information sharing with its suppliers (β=0.18, sig.=0.00). A similar result, is highlights concerning the investment carried out by a manufacturer in collaboration with its customers, as shown in Table 8 (β=0.12, sig.=0.01). Combining these two empirical evidence, a cultural environment in which people perceive hierarchical levels, and is comfortable with decisions taken from the most powerful members in society, seem to be favorable to achieve external integration, in terms of information sharing activities. This result is interesting. Previous research, has addressed the role of power relationship in managing supply chain (e.g., Zhao et al., 2008; Yeung et al., 2009). In particular, power, is a wide concept that French and Raven (1959) have classified as expert, referent, legitimate, reward and coercive. Although universal, Zhao et al. (2008) have traced how expert, referent and legitimate power reflect the extent through which a manufacturer decides to be influenced by its customers and how, conversely, reward and coercive power can be seen as the "weapon" that a customer has in order to influence the manufacturer's behavior. Yet, Zhao et al. (2008) have suggested how in a high power distance culture, such as China, although people is more willing to accept the use of coercion, the perception of power driven by identification of values, knowledge and legitimacy might also be significant. In this regard, according to the mentioned authors, coercion is negatively related to SCI whilst the use of non-mediated power (i.e. expert, referent and legitimacy) might foster normative integration, arguing their suggestion in the light of the establishment of normative relationship commitment between a manufacturer and a customer, where normative relationship commitment is defined as "a mutual, ongoing relationship over an extended period of time which is based on mutual commitment and sharing" (Zhao et al., 2008, p. 371), such as supply chain integration implies. These suggestion might be helpful in order to shed a light on our statistical results. In particular, a manufacturer located in a country with high power

distance culture, might be more prone to invest in information sharing integration either with its customers and suppliers, since might perceive more the mentioned sources of power, both in term of coercion, especially from a customer side, as well as in terms of recognition of values and knowledge, a nuance that might becomes relevant in explain the level of investment carried out in collaboration with suppliers.

Results concerning individualism-collectivism are, to some extent, counterintuitive, especially concerning the information sharing activities carried out by a manufacturer with its customers; indeed H1 is partially supported: although Table 6 (β=-0.13, sig.=0.01) highlights how individualism-collectivism is inversely related, regarding the integration activities between a focal company and its suppliers, Table 9 (β=-0.07, sig.=0.14) shows how the mentioned cultural-trait is, from customer side, not significant. Zhao et al. (2008) have argued how the above mentioned normative relationship commitment, might be more easy applied in a collectivistic culture, such as China. Starting from this suggestion, a focal company located in a collectivistic culture, might be more prone to collaborate, by receiving and exchanging information, in order to improve the overall supply chain performance perceiving less, in this sense, the threat of opportunistic behavior. The suggestion that in a collectivistic culture, people tend to pursue primarily the society's goals rather than their own is relevant: a manufacturer in collectivistic culture might tend to act with the aim to improve firstly the supply chain performance rather that their own: it follows that it will be more prone to share and integrate information. However, though this suggestion might explain the investment carried out with supplier, the perception of the power source, due to a high power distance culture, might lead a manufacturer to follow its customers regardless the fact to have an individualistic or collectivistic cultural orientation. It follows, that individualism-collectivism is not significant, as shown in Table 9.

Lastly, a vertical collectivism cultural orientation is strongly significant, supporting Hp3. As Table 7 shows, in a vertical collectivism culture a focal company has invested more in information sharing with its suppliers (β=0.20, sig.=0.00). A similar result, is highlighted also concerning the investment carried out in collaboration with customers, as Table 10 shows (β=0.12, sig.=0.01). It means, that countries such as Japan and Korea are those that have a culture more favorable to supply chain integration, in terms of information sharing activities. However, the result seem to be mainly driven by power distance. A suggestion that might be further investigated in future research.

3.6 CONCLUSION

The article provides evidence on the relevant role that cultural values have on supply chain integration practices. Specifically, focusing on information sharing activities, the study shows how the cultural traits of power distance and individualism-collectivism influence how a manufacturer has invested in information sharing either with its strategic customers and suppliers. It follows, that vertical collectivism cultural orientation is favorable to information sharing: this cultural configuration reflects, within a set of OECD economies, the characteristics of countries such as Japan, Mexico and Korea. More in the detail, power distance influences the extent through which a manufacturer has invested in information sharing both at supplier and customer sides, while the cultural trait of individualism-collectivism is not related to the level of investment with customers. These findings might be argued considering the hierarchy in a supply chain and, at the same time, how a manufacturer perceive the sources of power. A manufacturer located in a high power distance country, is more willing to accept coercion. As a result, a customer might impose to a focal company the sharing of information and, this latter, will be more willing to accept it, since its high power distance cultural orientation. Individualism-collectivism could become, in this regard, not relevant.

We deem our article to provide an interesting contribution both to theory and practice. Theoretically, this study might extend the debate on supply chain integration at global level. From a managerial point of view, we argue how managers should pay attention to the cultural implications of cross-cultural collaboration. This is due, not only to cultural conflicts as literature has already addressed, but also to the willingness of other companies of investing in collaboration means.

Lastly, we would like to highlights that our work is far from being free of limitations. First of all, the Hofstede's cultural framework. Other models, such as the GLOBE project (House et al., 2004) might lead to different results. Further, we have deliberately decided to focus our attention on those countries located in a OECD economy, in order to avoid issues due to differences in economical development. Therefore, we considered only seventeen countries; though it provide a good representation of different cultural archetypes and it is many more compared to what done in previous studies addressing supply chain integration, currently available in literature. Lastly, we considered only assembly industries and no other kinds of businesses (e.g., process industries).

APPENDIX A. CORRELATION MATRIX

Correlations matrix (* Sig <0.05;** Sig<0.01)

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.00											
2	**-0.14****	1.00										
3	-0.04	0.06	1.00									
4	**-0.18****	**0.36****	0.04	1.00								
5	-0.07	0.10*	-0.01	**0.13****	1.00							
6	**0.21****	**-0.17****	0.01	**-0.17****	**-0.14****	1.00						
7	-0.04	0.09*	0.04	0.06	0.10*	-0.04	1.00					
8	0.01	0.03	0.03	0.05	0.01	-0.03	-0.05	1.00				
9	-0.03	-0.08*	-0.03	-0.04	0.01	0.02	-0.06	**-0.58****	1.00			
10	-0.08	-0.04	-0.08	-0.06	-0.01	-0.09	0.00	**-0.68****	**0.85****	1.00		
11	**0.17****	-0.09	0.09	**-0.13****	-0.08	0.09	-0.05	**0.19****	-0.13*	**-0.21****	1.00	
12	0.05	-0.08	0.10*	**-0.15****	**-0.27****	0.08	-0.08	**0.13****	-0.08	-0.12*	**0.49****	1.00

Plant size (1), Subsidiary (2), Demand variability (3), Local sourcing (4), Supply chain position (5), Decoupling point (6), People's autonomy (7), Power distance (8), Individualism-collectivism (9), Vertical collectivism (10), Info sharing-suppliers (11), Info sharing-customers (12)

CHAPTER FOUR.
National culture and its implications for investments in unforeseen demand hedge practices

4.1 INTRODUCTION

The flattening of the world (Friedman, 2006), has brought manufacturers to deal with a more demanding customer and a more uncertain environment. As a consequence, being able to effectively hedge fluctuations in demand has begun essential to compete.

A structured forecasting management process (Metzer and Cox, 1984), able to give to companies the ability to better understand the customers' need, by relying on useful and updated information, as well as a flexible manufacturing system, defined as "the ability to change or react with a little penalty in time, effort, cost or performance" (Upton, 1994, p. 73), have been recognized as levers to cope with uncertainty in demand and mitigate risks, such as inefficient inventories levels and lateness in deliveries. In line with this consideration, as Fisher et al. (1994, p. 84) have noted, matching supply with demand requires an understanding of how uncertainty in demand manifests itself. These authors, argue the need to consider uncertainty within the production-planning processes, and suggest how companies should recognize "what forecasters can and cannot predict well, and then making the supply chain fast and flexible". As a result, unseen demand might be prevented and operational performance improved.

In the field of operations, understanding how the contextual conditions might affect the competitive advantage of companies and, more specifically, the manufacturing practices effectiveness, has given rise to a strand of studies named Operations Management Practice Contingency Research, aimed to address how manufacturing practices are effective, according to the changing contextual conditions in which they are applied (Sousa and Voss, 2008). Indeed, while managing business, managers need to pay heed to several contingencies that might influence the way operations should be orchestrated. Above all, national culture play a significant role in influencing the relationship between manufacturing practices and operational performance (Power et al., 2010; Kull and Wacker, 2010). As a result, within the Operations Management literature, the role of the national cultural characteristics has gained attention, and several authors have argued their relevance in explaining differences in the international operational decisions-making (Wacker and Sprague, 1998; Pagell et al., 2005).

Assuming a contingent perspective, the article investigates the influence of national culture for what concern the effectiveness of the unforeseen demand hedge practices, i.e. manufacturing practices able to help companies to strive with demand uncertainty so to improve a company operational performance. According to similar studies (Newman and Nollen, 1996; Power et al., 2010; Kull and Wacker, 2010; Wiengarten et al., 2011) throughout this article national culture will be used in a moderating perspective.

A plethora of studies (see Kirkman et al., 2006, for a review) has considered national culture through the Hofstede's cultural framework (1980). This author has classified countries along five dimensions, named: power distance, individualism-collectivism, uncertainty avoidance, masculinity-femininity and long-term orientation. The GLOBE project (House et al., 2004) has extended the Hofstede's taxonomy and nine cultural traits have been suggested: power distance, humane orientations, institutional collectivism, in-group collectivism, uncertainty avoidance, future orientation, performance orientation and gender egalitarianism. In line with recent literature (Zhao et al., 2007; Kull and Wacker, 2010; Naor et al., 2010), the article relies on the GLOBE project cultural values scores, in order to measure cultural differences among countries. According to the GLOBE project, culture is define as "shared motives, values, beliefs, identities, and interpretations or meanings of significant events that result from common experiences of members of collectives that are transmitted across generations" (House and Javidan, 2004, p. 15). Specifically, in this article culture will be treat in terms of values, and not in terms of behavior. Cultural differences will be evaluated considering what people perceive should be done in their societies and not considering "what is" realized within them in terms of practices and activities (House and Javidan, 2004); this approach is consistent with similar cross cultural operational management studies (Kull and Wacker, 2010; Naor et al., 2010).

The research issue addressed is as follow: does national culture affect the relationship between the investments in unforeseen demand hedge practices and the achieved operational performance? Emphasis is placed on those manufacturing practices that literature has deemed successful in managing unforeseen demand (Kalchschmidt et al., 2010). Thus, this research sheds light on how country culture influences both the relationship involving operational performance and the extent of forecasting practices (e.g., Wacker and Sprague, 1998) and manufacturing flexibility enablers. Two GLOBE cultural values have been taken into account: future orientation and uncertainty avoidance, i.e. the people's reliance on structured norms and rules to deal with unpredictable situations. Specifically, uncertainty avoidance is related

to the people's attitude to strive with uncertainties, therefore with risks and ambiguities. Thereby, this cultural trait mirrors the aim of the article, more specifically its focus on those manufacturing practices able to strive with uncertainties and risks. Similarly, future orientation is considered since underlines the propensity to plan long-term investment, thereby this trait might mirror a more flexible attitude in the people's behavior. Lastly, the effectiveness of the unforeseen demand hedge practices shall be evaluated through the achievement of the efficiency, measuring company cost's performance.

The purpose of the article is to contribute to Operations Management Practices Contingency Research, investigating the role of the mentioned national cultural values in affect the effectiveness of the unforeseen demand hedge practices; a not yet assessed management practices in a cultural moderating perspective. Further, the article aims to assist managers in implementing investments in unforeseen demand hedge practices, shedding light on those conditions that might increase their effectiveness.

The study is structured as follows. The next section reviews the literature and establish the research hypotheses. Then the research framework is discussed and the empirical methodology is described. Statistical results are then shown and their implications are explained. Finally, we point out the research conclusions as well as the managerial implications.

4.2 LITERATURE AND RESEARCH HYPOTHESES

The importance to understand how companies can improve their performance is at the heart of an extensive stream of literature. According to this strand, the concept of manufacturing strategy has gained attention and several scholars have devoted their efforts to the role of manufacturing strategies in achieve a competitive advantage (e.g., Skinner, 1969; Hayes and Wheelwright, 1984; Hill, 1989; Hayes and Pisano, 1994; Hill, 1993). Three perspectives are emerged: competing through manufacturing, strategic choice and best practices (Voss 1995; 2005). Specifically, companies can compete through a set of operational capabilities aligned with the corporate strategies and the market requirements (Hill, 1993); manufacturing choices need to be consistent to the company strategies as well as to the business environment (Skinner, 1969; Hill, 1993) and companies can invest in manufacturing "best" practices in order to improve their operational performance.

Literature does not reach consensus about the main essence of the 'best practices' concept: a first stream of research is rooted in the concept of World Class Manufacturing and

defines them as those practices that lead to a superior performance (Camp, 1989; Hayes and Wheelwright, 1984; Schonberger, 1986). A second strand, defines best practices as those practices adopted in the best performing organizations (Davies and Kochhar, 2002; Laugen et al., 2005). The first vein embraces an universal perspective, according to which adopt best practices will lead to achieve better performance, whereas the second suggests a contingent approach, according to which companies should adopt manufacturing "best" practices coherently to those situations that might influence their effectiveness. Strategic management and organizational literature have provided three theories under which the manufacturing "best" practice paradigm could be analyzed. The first approach assume an universalistic perspective: it acknowledges that to adopt manufacturing "best" practices has a positive impact on company's performance, in any situations: therefore manufacturing "best" practices can be mimicked by all the organizations. The second approach, named contingent, acknowledges that to invest in manufacturing "best" practices does not give the same results in improve operational performance; results depend upon the specific context in which the manufacturing "best" practices are applied. Specifically, this approach acknowledges that an organization should adapt itself to the changing contextual conditions in order to maintain or achieve better performance (Donaldson, 2001). This theory has been applied in different fields (Delery and Doty, 1996; Youndt et al., 2006; McCarthy et al., 2006) including manufacturing strategy. Specifically, in this vein, contingency theory has given rise to a stream of research called Operations Management Practices Contingency Research. This strand has been reviewed in Sousa and Voss (2008).

The universal approach and the contingency perspective are not mutually exclusive. As Youndt et al. (1996, p. 837) have noted, the universal approach investigates the effectiveness of the manufacturing "best" practices "across all context, ceteris paribus", while the contingency perspective shed a light on those situations and conditions that enhance the understanding of what is considered, focusing on a narrow set of variables, that might foster or hinder the successful of the manufacturing "best" practices implementation. The latter theory, configurational, is rooted into the concept of "equifinality" and states that there are several ways to achieve the organizational fit to the external or internal environment. This theory encompasses the concept of ideal types, according to which an organization should be matched in order to improve its competitiveness (Bozarth and McDermott, 1998).

Contingency theory is the theoretical lens adopted throughout the article; in this sense, Sousa and Voss (2008) have identified several contingencies that companies are facing,

including national context and culture. Specifically, in the field of Operations Management, cultural issues have increased their relevance since manufacturing have become international. In this vein, Prasad and Babbar (2000) have suggested how national culture might influences the companies' manufacturing areas (e.g. scheduling, forecasting, facility location) and Pagell et al. (2005) how national context and culture might explain differences in the international operational decision-making.

A strand of research has shown how countries' culture might affect the extent through which manufacturing practices improve operational performance. Naor et al. (2010) have considered the fit between organizational culture, national culture and manufacturing performance, Power et al. (2010) the role of individualism-collectivism in explain differences in operational investments between Asiatic and Western countries, Kull and Wacker the influence of national culture on quality management effectiveness and Wiengarten et al. (2011) the impacts of cultural traits in moderating how the investments in manufacturing practices improve operational performance.

Moreover, Wacker and Sprague (1998) have suggested how national culture affect the extent through which companies rely on forecasting practices (e.g. quantitative techniques, computer usage, information use, forecast development) and their accuracy, Flynn and Saladin (2006) the effectiveness of the Baldrige criteria and Hahn and Bunyaratavey (2010) how national culture might explain the companies choices on the location of service offshoring projects.

4.2.1. Operational performance and unforeseen demand hedge practices

The uncertainty regarding volume and mix of final demand has been seen as a source of risk which manifest itself in terms of poor operational performance for the company. According to the literature (Ritzman and King, 1993; Ebert and Lee, 1995; Diamantopoulos and Winklhofer, 1999; Zotteri and Kalchschmidt, 2007; Kalchschmidt et al., 2010; Danese and Kalchschmidt 2011a; Danese and Kalchschmidt 2011b), unpredictable demand, which often result in forecasting inaccuracies, give rise to several issues for companies such as inadequate inventories level, inefficient equipment utilization, larger throughput time. As a consequence, in a world of uncertain demand, manufacturing costs tend to increase significantly and only companies able to deal with this issue can maintain or augment their performance.

A vast literature has suggested how demand forecasting and a flexible manufacturing system might help companies to deal with unpredictable changes in demand (e.g., Gerwin, 1993; Diamantopoulos and Winklhofer 1999; Koste and Malhotra 1999; Beach et al., 2000; Ho et al., 2005; Zotteri and Kalchschmidt, 2007; Kalchschmidt et al., 2010; Danese and Kalchschmidt, 2011a). First of all, demand forecasting can be considered as a process that involves several areas of a company (e.g., production, marketing). In this sense, several decisions, within a company, need an accurate forecast (e.g., sales, budget, production planning) in order to reduce risks and uncertainties. It follows, that the demand forecast process should be accurately managed, in order to increase accuracies and improve as a consequence companies' performance.

In line with these considerations, and relying on Danese and Kalchschmidt (2011a), this article considers a set of elements that characterize the forecasting process: the techniques adopted, both quantitative and qualitative, the use of different sources of information to elaborate forecast, and the role that forecast assumes in decision-making. Specifically, previous studies have point out a direct relationship between the use of a structured forecasting process and the improvement of operational performance. Scholars have shown how to adopt forecasting techniques (e.g., time series, qualitative methods), combine information from different sources in elaborating forecast (e.g., customer information, supplier information, market research) as well as the role of forecast in supporting decision-making contributes to improve company's competitiveness, both in terms of cost and delivery (Danese and Kalchschmidt, 2011a; 2011b).

Differently, flexible manufacturing systems refer to "the ability to change or react with a little penalty in time, effort, cost or performance" (Upton, 1994, p. 73). In line with this consideration, Upton (1995) has classified manufacturing flexibility in its internal and external attributes, distinguishing between what companies do and what customers demand. Internal flexibility refers to the competencies that companies have in order to enable "the firm to achieve the desired levels of flexible capabilities" whilst external flexibility to the "linkage among corporate, marketing and manufacturing strategy" (Zhang et al., 2003, p. 176). Literature suggests to consider those practices deemed successful to foster company's flexibility (e.g., set up time reduction, TQM) to evaluate the effect of flexibility on companies' performance. This suggestion is traced in Kalchschmidt et al. (2010), according to which to consider flexibility enablers might help researchers to overcome the difficulties related to the multidimensional aspect of flexibility. Thus, to invest in a structured forecasting

process, as well as in improvement programmes enabling flexibility, has been deemed as a suitable approach to absorb unpredictable fluctuations in demand, and improve operational performance (Zotteri and Kalchschmidt, 2007; Kalchschmidt et al., 2010).

These two levers are interchangeable: as Zotteri and Kalchschmidt (2007, p. 85) have written, "the need of an accurate forecast might depend on the level of investment in flexible manufacturing system", indicating how flexibility and forecasting can contribute to increase the operational performance of companies, by hedging fluctuations in demand. Indeed, a flexible manufacturing system, due to the implementation of manufacturing practices such as JIT and set-up time reduction, might absorb the impacts that inaccuracies in forecasting (e.g., high inventories level, rescheduling, equipment utilization, lateness in delivery) have on manufacturing. This strand, recognized the role of accuracy in influencing manufacturing performance and highlight the fact that flexibility might replace it: manufacturing flexibility is suitable in those companies in which foresee future demand is quite complex, while a structured forecasting process in companies lacking the necessary resources to invest in programmes able to increase their quickness and responsiveness to the changing demand (Kalchschmidt et al., 2010).

The literature suggests that unforeseen demand hedge practices may be more or less effective according to the environment in which they are adopted. For instance, several scholars have considered the role that different contingencies might exert on forecast practices and accuracy. Diamantopoulos and Winklhofer (1999) have taken into account environmental turbulence, Sanders and Manrodt (1994) companies' size and Wacker and Sprague (1998) cultural characteristics. Similarly, although manufacturing flexibility is deemed suitable to respond to uncertainties in competitive environment and achieve a sustainable competitive advantage (Sethi and Sethi, 1990; Gerwin, 1993; Upton, 1994; Zhang et al., 2003), the multidimensional aspect of the term and an elusive definition (Klassen and Angell, 1998), has given rise to numerous conflicting in understanding its impact on operational performance (Vokurka and O'Leary Kelly, 2000). A first strand of research has studied how manufacturing flexibility directly impacts companies' performance (Swamidass and Newell 1987, Gupta and Somers 1996, Vickery et al., 1997), while a second vein (Fiengenbaum and Karnani, 1991; Parthasarthy and Sethi, 1993; Ward et al., 1995) how different contingencies (e.g., size, environment) can affect this relationship (see Vokurka and O'Leary Kelly, 2000, for a review). The interest demonstrated towards the contingency perspective and the ambiguities discussed above provides a strong motivation to this research.

4.2.2. The role of national culture in operations management

Cross-cultural studies, dealing with the transferability and the effectiveness of the manufacturing practices across plants located in different countries, may rely on two contrasting assumptions: the "convergence" hypothesis and the "divergence" hypothesis (Rungtusanatham et al., 2005; Naor et al., 2010; Vecchi and Brennan, 2011).

The "convergence" hypotesis (Form, 1979) posits similarity across countries in terms of efficient adoption of manufacturing practices, arguing this thought in terms of learning, industrial and technological development. Conversely, the "divergence" hypothesis (Child and Kieser, 1979), acknowledges that different factors (e.g., technological, social) might affect how companies effectively adopt manufacturing practices; as a consequence, differences across countries arise. Among these, the role of national culture has been recognized as important in explaining differences across countries in terms of implementation and effectiveness of manufacturing practices. Considering both perspectives without being biased, Naor et al. (2010, p. 195) have noted how different studies suggest how "national culture could affect organizational culture since managerial assumptions about employee nature and behavior may be influenced by national culture". Other scholars have share the same thought: specifically, Rungtusanatham et al. (2005, p. 48), drawing on Lammers and Hickson (1979), have wrote how culture is "a pervasive phenomenon that permeates into organizations" strengthening the cultural-specific argument in the field of manufacturing research.

Several frameworks can be used in order to investigate the influence that national culture has on the way companies manage their business (Hofstede, 1980; Trompenaars and Hampden-Turner, 1998, 2000; Schwartz, 1994; House et al., 2004). Among these, the well-know Hofstede's (1980) model has classified culture through four dimensions (i.e. power distance, individualism-collectivism, uncertainty avoidance, masculinity-femininity) with a fifth index, named long-term orientation, added later. Hofstede (1980) defines culture as the "collective programming of the mind which distinguish the members of one group or category of people from those of another" and suggests how "cultural influences on management are most clearly recognizable at the national level" (Hofstede, 1994, p.4).

The GLOBE project (House et al., 2004) has extended the Hofstede's findings, encapsulating culture into nine cultural dimensions, namely: power distance, humane orientations, institutional collectivism, in-group collectivism, uncertainty avoidance, future orientation, performance orientation and gender egalitarianism, providing the most updated

cultural framework. The GLOBE project is deemed suitable in measuring the organizational culture inside a company (Naor et al., 2010), given its aim to assess the impact that national cultural values have on organizational practices, as wrote in Vecchi and Brennan (2011, p. 532). Moreover, the GLOBE cultural model, has been adopted in previous operational management studies, dealing with cross-cultural comparison; Kull and Wacker (2010) have used it in order to evaluate the effectiveness of quality management, Naor et al. (2010) in order to link national culture, organizational culture and operational performance and Vecchi and Brennan (2011) in exploring how TQM might differ across countries.

4.2.5. Hypotheses development

As previously stated, the article aims to investigate the role of national culture in moderating how the investments in unforeseen demand hedge practices improve operational performance. As mentioned, this study assesses cultural differences by considering the future orientation and the uncertainty avoidance cultural traits. We believe that these characteristics are suitable for the purpose of article, i.e. understanding the effect of national culture about the effectiveness of the unforeseen demand hedge practices, across plant located in different countries in the world. The next section, explains the meaning of the mentioned cultural traits and establishes the research hypothesis.

Uncertainty avoidance (UA) refers "to the extent to which members of an organization or society strive to avoid uncertainty by relying on established social norms, rituals and bureaucratic practices" (House et al., 2004, p. 11). This trait underlines the people's need of rules, laws, clarity and standardized procedures, to handle and alleviate uncertainty. As previously stated, uncertainty avoidance underlines the people's attitude towards risk; an uncertainty avoidance culture will be more risk averse, since it is perceived as a threat. This suggestion acknowledges as traced in Clark (1990) and in Doney et al. (1998), according through which uncertainty avoidance "addresses the concepts of risk, risk preference, and reliance on risk-reducing strategies" (Doney et al., p. 614). Therefore, employees in UA culture are expected to rely more on activities that enact uncertainty reduction, such as formal methods, data analysis, feedback and information sharing (Wacker and Sprague, 1995). As a consequence, in formulating the research hypotheses, we acknowledge that the use of "scientific methods improves the accuracy of forecasts" (Naor et al. , 2010, p. 197); it follows, that operational performance in terms of cost increases. At first glance, employees from UA culture are conflicting with a flexible environment. However, flexibility is deemed suitable to

react to unforeseen changes, as well as to manage uncertainties. Given these counterbalancing perspective, no hypothesis are given relating to flexibility enablers. From the above, and coherently with the aim of the article to consider efficiency performance, we posits:

H1a: The degree of uncertainty avoidance positively moderates the effectiveness in improve company cost's performance of the investments in forecasting techniques.

H1b: The degree of uncertainty avoidance positively moderates the effectiveness in improve company's cost performance of the extent through which information from multiple sources are considered in elaborating the forecast.

H1c: The degree of uncertainty avoidance positively moderates the effectiveness in improve company cost's performance of the extent through which the forecast is adopted in decision-making.

Future orientation refers "to the degree to which individuals in organization or societies engage in future oriented behavior such as planning, investing in the future, and delaying individual or collective gratification" (House et al., 2004, p. 12). People in a country with high future orientation is more willing to delay gratification, planning long-term investments and is, by definition, committed to future changes anticipation. Further, as Ashkanasy et al. (2004) have noted, future orientation is related to organization's flexibility. Thereby a culture more future oriented creates an organizational environment suitable to cope with an uncertain context and might be more at ease with risks and uncertainties. From the above, and coherently with the aim of the article to consider efficiency performance, we posits:

H2a: The degree of future orientation positively moderates the effectiveness in improve company's cost performance of the investments in forecasting techniques .

H2b: The degree of future orientation positively moderates the effectiveness in improve company's cost performance of the extent through which information from multiple sources are considered in elaborating the forecast.

H2c: The degree of future orientation positively moderates the effectiveness in improve company's cost performance of the extent through which the forecast is adopted in decision-making

H2d: The degree of future orientation positively moderates the effectiveness in improve company's cost performance of the investments in flexibility enablers practices.

Figure 1 depicts the research framework:

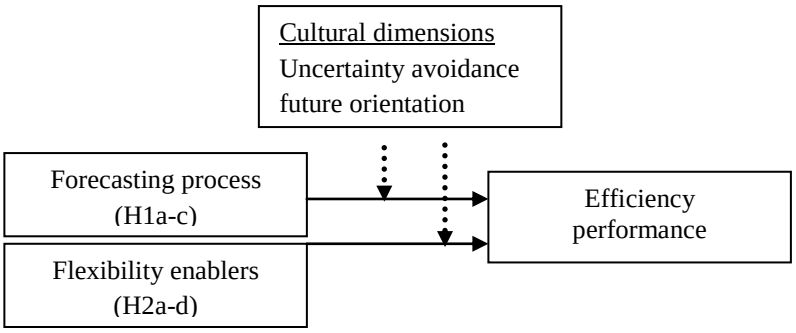


Figure 2- Research Framework.

4.3 RESEARCH METHODOLOGY

4.3.1. Sample

The data used to empirically test the aforementioned research hypotheses were gathered by the 4th round of the Global Manufacturing Research Group questionnaire, conducted between 2006 and 2009. The Global Manufacturing Research Group is a worldwide project carried out by international researchers, aimed to study manufacturing practices across plants located in different countries in the world. The scale development and the survey instruments, adopted by the Global Manufacturing Research Groups, have been deemed suitable to assess and compare manufacturing practices across countries (see, Whybark, 1997; Kull and Wacker, 2010; Power et al., 2010).

Given that the focus of the article is to consider the effectiveness of the unforeseen demand hedge practices across countries, this research uses a part of the whole Global Manufacturing Research Group 4th round database; specifically the items relating to the adoption of forecasting techniques, the use of different sources of information in elaborating forecast and the role of forecast in decision-making, as well as the items concerning the extent of investments in manufacturing practices deemed suitable to enable process flexibility: just in time, manufacturing throughput time reduction, set-up time reduction and Total Quality Management (Kalchschmidt et al., 2010). Further, the items relating to the plant's performance, compared to those of competitors, in terms of manufacturing cost, product cost and raw material cost are considered. The sample is further limited to those companies whose answers were valid for the analysis and to those countries for which the cultural values were available. Therefore, 314 manufacturing plants from 10 countries were been used. The plant is the unit of analysis. Table 1 shows the sample description.

Table 2- Sample Description and National culture values according to GLOBE[1]

Country	Size	Uncertainty avoidance	Future orientation
Albania	6	5.37	5.42
Austria	9	3.66	5.11
Hungary	41	4.66	5.70
Ireland	27	4.02	5.22
Italy	34	4.47	5.91
Mexico	50	5.26	5.86
Poland	47	4.71	5.20
South Korea	59	4.67	5.69
Sweden	25	3.60	4.89
Switzerland	16	3.16	4.80
Obs	314		
Small companies (≤ 50 employees)	76		
Medium companies (51-250 employees)	134		
Large companies (> 250 employees)	104		
Mean number of plant's employees	651		

1 Source: House et al., 2004 (uncertainty avoidance–p.623 future orientation-p.306)

4.3.2 Measurements

A set of items in the Global Manufacturing Research Group 4th round database have been used in the article. Multi-item constructs are created, consistently with previous studies.

The forecasting process is studied considering the adoption of forecasting techniques, the extent through which different sources of information are used in elaborating forecast and the role that forecast assume in decision-making (Danese and Kalchschmidt 2011a; Danese and Kalchschmidt 2011b). The adoption of forecasting techniques have been evaluated by asking to respondents to indicate the extent through which quantitative time series methods (e.g., exponential smoothing) quantitative casual models (e.g., regression analysis) and qualitative models (e.g., market survey) are used in the company for foresee future sales. In order to evaluate the use of information in elaborating forecast, respondents were to indicate the extent through which the following quantitative information' sources were considered into the company's forecast: current economic condition, customer's numerical sales plan, supplier information, and results of market research. The role of forecast in decision-making has been evaluated by asking to respondents to indicate the extent through which forecast is used for different purposes: sales and budget preparation, production planning, new product launches and equipment planning. Finally, a set of composite measures, named, respectively, *techniques*, *information* and *role* have been created, relying on Danese and Kalchschmidt (2011a; 2011b).

With regard to the manufacturing flexibility, we measure the extent of resources (e.g., money, time and people) that, in the last two years, the plant has invested in initiatives and programmes deemed suitable to enable process flexibility (e.g., just in time, manufacturing throughput time reduction, set-up time reduction and TQM). A composite measure named *flexibility enablers* is created which is consistent with the work of Kalchschmidt et al. (2010). The items are measured through a scale, ranging from "not at all" (value=1) to "a great extent" (value=7).

Lastly, the items concerning the manufacturing cost, product cost and raw material cost are used to measure the plant's efficiency performance, compared to the competitors ones. A construct named *cost performance* has been created. The mentioned items are used in several studies in order to evaluate cost performance (e.g., Power et al., 2010; Danese and Kalchschmidt 2011a; Danese and Kalchschmidt 2011b) and are measured through a scale ranging from "far worse" (value=1) to "far better" (value=7). Tables 2-3 summarize the information concerning our measurements. Factor loadings are all above the 0.4 threshold (Nunally and Bernstein, 1994) and Cronbach's alpha exceed 0.6 for each construct, indicating reliability of the scales (Nunally and Bernstein, 1994). Kaiser-Meyer-Olkin test proves further support for the factors reliability. Table 4 shows the correlation matrix among the constructs.

Table 3- Unforeseen demand hedge practices - Factor Analysis

Loading	**Techniques**	**Loading**	**Information**
0.839	Quantitative time series	0.684	Current economic conditions
0.820	Casual models	0.699	Customer sales
0.676	Qualitative models	0.743	Supplier information
		0.698	Market research
KMO	0.624		0.697
Bartlett test	Chi-Squared 166.748		Chi-Squared 173.997
Cronbach's alpha	0.678		0.663
Variance explained	0.611		0.498
Loading	**Role**	**Loading**	**Flexibility enablers**
0.751	Sales and budget preparation	0.746	Just in Time
0.841	Production Planning	0.837	Manufacturing throughput time reduction
0.627	New product development	0.801	Set-up time reduction
0.755	Equipment planning	0.761	TQM
KMO	0.727		0.776
Bartlett test	Chi-Squared 274.857		Chi-Squared 367.933
Cronbach's alpha	0.727		0.791
Variance explained	0.559		0.620

Table 4- Cost performance - Factor Analysis

Loading	**Cost**
0.8662	Manufacturing cost
0.8835	Product cost
0.7042	Raw material cost
KMO	0.632
Bartlett test	Chi-Squared 275.820
Cronbach's alpha	0.753
Variance explained	0.675

Table 5- Correlations among constructs – Sig.<0.05

	1	2	3	4	5
Technique (1)	1				
Information (2)	0.4883*	1			
Role (3)	0.4005*	0.5074*	1		
Flexibility (4)	0.4220*	0.3947*	0.3729*	1	
Cost Performance (5)	0.1545*	0.2632*	0.1077	0.1849*	1

The GLOBE framework is used in the article. Specifically, for each country in which the plant is located, data regarding the national culture values are considered. The GLOBE project extends the Hofstede's (1980) model, assessing national culture in 62 different countries, on the bases of responses provided by 17,300 managers from 951 organizations (House et al., 2004). We refers to Hanges and Dikson (2004) for what concerns the detail about the development and validation of the GLOBE cultural values scale. Among the nine cultural traits provided in the GLOBE framework, the future orientation and the uncertainty avoidance dimensions are considered. Table 1 shows the mentioned GLOBE cultural values for each country in which the plants are located. Cultural values are measured through a Likert-scale, ranging from 1 to 7 where higher scores indicate greater uncertainty avoidance as well as future orientation.

Three control variables have been added: company size, firm's process choice and demand range. To control for company's size, the logarithm of the number of plant's employees is been considered, whereas the firm's process choice is been evaluated through the percentage of manufacturing orders processed as "make-to-stock". This approach is consistent to Power et al. (2010). Lastly, demand range has been evaluated by asking to respondents to indicate the highest monthly demand and the lowest monthly demand, given 100 as the average. Demand range is defined consistently with Danese and Kalchschmidt (2011a) as the difference between the highest monthly demand and the lowest monthly

demand, divided by 100. This measure is added in order to have a proxy of the company's uncertainty.

4.4 ANALYSIS AND RESULTS

Research hypothesis are tested through a set of multivariate analysis. Hierarchical approach (Wampold and Freud, 1987) was applied, with the aim to assess if the inclusion of interaction terms allows to increase the percentage of variance explained in the dependent variable. Each variables were standardized and mean centered. We controlled each step of the procedure by checking for the variance inflation factor and the conditional index. Multicollinearity is not an issue for any model, since the variance inflation factor is always lower than 2 with a cut-off between 5 and 10 (Neter et al., 1989; Hair et al., 1998; Menard, 2000), as well as the conditional index (Belsey et al., 2004). The effect of control variables on cost performance were firstly evaluated (Model 1). Afterwards, a regression analysis including control variables and one unforeseen demand hedge practice was run (Model 2). Further, the cultural traits were entered (Model 3) and, lastly, the interaction term between the practice and the cultural traits is considered (Model 4). Standardized beta coefficients are reported.

4.4.1. Uncertainty avoidance affect unforeseen demand hedge practices

Tables 5-7 show the results concerning the multivariate regression analysis carried out considering the unforeseen demand hedge practices and the uncertainty avoidance cultural trait. As we can see, a positive moderation effect exists for what concern the interaction term between the forecasting process variables and uncertainty avoidance (UA), supporting hypothesis H1a-c.

As previously stated, the effect of the forecasting process variables on cost performance is positively moderated by uncertainty avoidance; this mean that the more the uncertainty avoidance of the country is high, the more the forecasting techniques are deployed effectively, resulting in superior cost performance at the plant level ($\beta_{\text{Techniques X UA}} = 0.107$ $p= 0.045$, Δ R-squared = 0.0112 $p<0.05$) (Table 5). Similarly, for what concern the use of different sources of information in elaborating the forecast ($\beta_{\text{Information X UA}} = 0.093$ $p= 0.081$, Δ R-squared = 0.082 $p<0.10$) (Table 6) as well as the role that forecast assumes in the company's decision-making ($\beta_{\text{Role X UA}} = 0.139$ $p = 0.010$, Δ R-squared = 0.0184 $p <0.01$) (Table 7).

Table 6 - OLS regression results, DV = cost performance

Variables	Model 1		Model 2		Model 3		Model 4	
	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t
Size	0.019	0.736	-0.018	0.763	0.036	0.527	0.034	0.542
MTS	**0.124**	**0.029**	**0.108**	**0.056**	**0.151**	**0.005**	**0.152**	**0.005**
Demand range	-0.040	0.478	-0.036	0.527	-0.028	0.598	-0.025	0.633
Technique			**0.142**	**0.016**	0.066	0.249	0.068	0.228
UA					**0.333**	**0.000**	**0.347**	**0.000**
Technique*UA							**0.107**	**0.045**
Prob>F	0.12		0.020		0.000		0.000	
R-square	0.02		0.04		0.14		0.15	
Adj-r square	0.01		0.02		0.13		0.13	
Δ R-squared			0.0184**		0.1033***		0.0112**	
Obs	314		314		314		314	

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 7 - OLS regression results, DV = cost performance

Variables	Model 1		Model 2		Model 3		Model 4	
	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t
Size	0.019	0.736	-0.05	0.336	-0.004	0.943	-0.006	0.908
MTS	**0.124**	**0.029**	**0.142**	**0.010**	**0.167**	**0.002**	**0.165**	**0.002**
Demand range	-0.040	0.478	-0.04	0.468	-0.031	0.554	-0.032	0.535
Information			**0.282**	**0.000**	**0.201**	**0.000**	**0.200**	**0.000**
UA					**0.295**	**0.000**	**0.315**	**0.000**
Information*UA							**0.093**	**0.081**
Prob>F	0.12		0.000		0.000		0.000	
R-square	0.02		0.09		0.17		0.18	
Adj-r square	0.01		0.08		0.16		0.16	
Δ R-squared			0.0737***		0.0789***		0.0082*	
Obs	314		314		314		314	

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 8- OLS regression results, DV = cost performance

Variables	Model 1		Model 2		Model 3		Model 4	
	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t
Size	0.019	0.736	-0.015	0.803	0.02	0.71	0.003	0.952
MTS	**0.124**	**0.029**	**0.123**	**0.030**	**0.16**	**0.00**	**0.175**	**0.001**
Demand range	-0.040	0.478	-0.038	0.500	-0.03	0.60	-0.023	0.660
Role			**0.105**	**0.080**	**0.10**	**0.07**	**0.111**	**0.046**
UA					0.35	0.00	0.329	0.000
Role*UA							0.139	0.010
Prob>F	0.12		0.064		0.000		0.000	
R-square	0.02		0.03		0.15		0.16	
Adj-r square	0.01		0.02		0.13		0.15	
Δ R-squared			0.0097*		0.1173***		0.0184***	
Obs	314		314		314		314	

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

4.4.2. Future orientation affect unforeseen demand hedge practices

Tables 8-11 show the results concerning the multivariate regression analysis considering the unforeseen demand hedge practices and future orientation (FO) (H2a-d). First of all, future orientation does not moderate the effectiveness of the use of different sources of information in elaborating the forecast (Table 9), rejecting hypothesis H2b. Although weakly, future orientation moderates both the effectiveness of the techniques adopted ($\beta_{\text{Techniques X Future orientation}} = 0.098$ p= 0.088, Δ R-squared = 0.0088 p<0.10) as well as the role that forecast assumes in decision making ($\beta_{\text{Role X Future orientation}} = 0.102$ p= 0.067, Δ R-squared = 0.0101 p<0.10), providing limited support for hypothesis H1a and H1c (Tables 10-11).

With regards to flexibility enablers, results are more intriguing. Table 11 shows how the interaction term between future orientation and flexibility enablers is significant ($\beta_{\text{Flexibility enablers X Future orientation}} = 0.125$ p= 0.025, Δ R-squared = 0.0151 p<0.05), supporting hypothesis H2d.

Table 8 - OLS regression results, DV = cost performance

Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t
Size	0.019	0.736	-0.018	0.763	-0.009	0.875	-0.024	0.686
MTS	**0.124**	**0.029**	**0.108**	**0.056**	**0.120**	**0.032**	**0.119**	**0.033**
Demand range	-0.040	0.478	-0.036	0.527	-0.042	0.448	-0.038	0.492
Technique			**0.142**	**0.016**	**0.112**	**0.056**	**0.120**	**0.040**
FO					**0.182**	**0.001**	**0.204**	**0.000**
Technique*FO							**0.098**	**0.088**
Prob>F	0.12		0.020		0.001		0.000	
R-square	0.02		0.04		0.07		0.08	
Adj-r square	0.01		0.02		0.05		0.06	
Δ R-squared			0.0184**		0.0322***		0.0088*	
Obs	314		314		314		314	

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 9 - OLS regression results, DV = cost performance

Variables	**Model 1**		**Model 2**		**Model 3**		**Model 4**	
	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t
Size	0.019	0.736	-0.05	0.336	-0.050	0.372	-0.051	0.370
MTS	**0.124**	**0.029**	**0.142**	**0.010**	**0.149**	**0.006**	**0.149**	**0.006**
Demand range	-0.040	0.478	-0.04	0.468	-0.045	0.403	-0.045	0.403
Information			**0.282**	**0.000**	**0.266**	**0.000**	**0.266**	**0.000**
FO					**0.177**	**0.001**	**0.179**	**0.002**
Information*FO							0.006	0.922
Prob>F	0.12		0.000		0.000		0.000	
R-square	0.02		0.09		0.123		0.123	
Adj-r square	0.01		0.08		0.109		0.106	
Δ R-squared			0.0737***		0.0312***		0.0000	
Obs	314		314		314		314	

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 10 - OLS regression results, DV = cost performance

Variables	Model 1		Model 2		Model 3		Model 4	
	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t
Size	0.019	0.736	-0.015	0.803	-0.02	0.72	-0.037	0.529
MTS	**0.124**	**0.029**	**0.123**	**0.030**	**0.13**	**0.02**	**0.136**	**0.014**
Demand range	-0.040	0.478	-0.038	0.500	-0.04	0.43	-0.042	0.448
Role			**0.105**	**0.080**	**0.12**	**0.03**	**0.136**	**0.021**
FO					**0.21**	**0.00**	**0.213**	**0.000**
Role*FO							**0.102**	**0.067**
Prob>F	0.12		0.064		0.000		0.000	
R-square	0.02		0.03		0.07		0.08	
Adj-r square	0.01		0.02		0.06		0.06	
Δ R-squared			0.0097*		0.0435***		0.0101*	
Obs	314		314		314		314	

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

Table 11 - OLS regression results, DV = cost performance

Variables	Model 1		Model 2		Model 3		Model 4	
	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t	Std.Beta	P>t
Size	0.019	0.736	-0.026	0.652	-0.018	0.758	-0.026	0.654
MTS	**0.124**	**0.029**	**0.117**	**0.036**	**0.126**	**0.023**	**0.135**	**0.015**
Demand range	-0.040	0.478	-0.056	0.321	-0.058	0.294	-0.061	0.267
Flexibility enablers			**0.187**	**0.001**	**0.155**	**0.007**	**0.160**	**0.005**
FO					**0.171**	**0.002**	**0.192**	**0.001**
Flexibility enablers*FO							**0.125**	**0.025**
Prob>F	0.12		0.00		0.000		0.000	
R-square	0.02		0.05		0.08		0.09	
Adj-r square	0.01		0.04		0.06		0.08	
Δ R-squared			0.0329***		0.0283***		0.0151**	
Obs	314		314		314		314	

**Sig.<0.1; **Sig.<0.05; ***Sig.<0.01*

4.5 DISCUSSION

Coherently with the aim of the article to evaluate the role of national cultural values in fostering or hampering the effectiveness of the investments in unforeseen demand hedge practices, i.e. those practices that might help companies to strive with an uncertain environment, a set of research hypothesis were tested. Two cultural dimensions have been considered: the reliance of people on norms and procedure to alleviate uncertainty and strive with risks and ambiguities (i.e., uncertainty avoidance), and the willingness of people to delay gratification, planning long-term investments (i.e., future orientation). Results show how national cultural values affect the effectiveness of the unforeseen demand hedge practices.

First of all, it's worthy to note how national cultural values have an influence on the relationship between the adoption of unforeseen demand hedge practices and company's cost

performance. According to the contingency theory, the effectiveness of the manufacturing "best" practices depends upon the contextual conditions faced by companies (Davies and Kochhar, 2002; Laugen et al., 2005; Sousa and Voss, 2008). Uncertainty avoidance is the cultural trait more related to the people's attitude toward risks and positively affects the effectiveness of the forecasting process variables, though weakly for what concern the use of different sources of information. Uncertainty avoidance, refers to the people's need for rules, clarity, norms, in order to strive with an uncertain future. Thus, employees in an high uncertainty avoidance organization are comfortable with practices able to cope with anxieties and ambiguities, as several authors noted (e.g., Kull and Wacker, 2010; Wiengarten et al., 2011). Following this thought, manufacturing plants located in countries with high uncertainty avoidance express a natural attitude towards anticipation and risk reduction, which result in higher effectiveness of forecasting practices. Employees from uncertainty avoidance cultures tend to rely more on feedback and information, in order to alleviate uncertainties. It follows, that integrating forecast with a wide set of information is more beneficial in an environment in which employees strive with anxiety and are amenable to clarity. This thought is statistically supported, though weakly. Moreover, hypothesis concerning the role of future orientation in positively moderate the effectiveness of the extent through which information from multiple sources are used in elaborating forecast, has been rejected. The synergistic effect is statistically not significant.

Then, future orientation positively moderates the relationship between flexibility enablers (i.e., JIT, set-up time reduction and TQM) and cost performance. Also, it significantly moderates the effects of forecasting techniques as well as the role that forecast assumes in decision making; further, the use of different sources of informations in elaborating forecast is not moderated. When the extent of the investment in flexibility enablers is considered, future orientation positively changes the level of the company's efficiency performance. More in the detail, future oriented cultures tend to create an environment suitable to cope with uncertainties, rather than only anticipate them. Employees are comfortable with longer-horizon planning, and flexible structures are accepted. Therefore, in future oriented cultures, to invest in manufacturing practices deemed successful in enhance the process's flexibility might result more profitable to strive with uncertainties and the related risks.

Finally, results can also be interpreted by leveraging the "convergence" vs. "divergence" arguments. Coherently with the purpose to improve efficiency performance, the

more a company invests in a structured forecasting process the more the uncertainty avoidance cultural trait should be considered. Similarly, future orientation becomes relevant when a company invests in process's flexibility. Thereby, for this set of practices the "divergence" thought is embraced, arguing how the considered national culture characteristics affect the effectiveness of the investments in unforeseen demand hedge practices. Specifically, effectiveness changes according to the cultural environment that companies are facing; the contingent perspective is supported. Conversely, the "convergence" argument can be used when the use of information in forecast is considered. The role that the use of a wide set of information has when companies elaborates their forecast is only weakly moderated by uncertainty avoidance and is not moderated by future orientation. Hence, the importance of information in managing demand uncertainty is converging across countries.

4.6 CONCLUSION

An effective management of unforeseen demand is necessary for companies that aim to maintain or increase their operational performance. Although unforeseen demand hedge "best" practices have been deemed suitable to strive with uncertainties so to obtain better cost performance, several contingencies might impact their effectiveness. Embracing the contingency perspective and relying on GLOBE classification of national cultures, the article has investigates the role of uncertainty avoidance and future orientation in the demand management context. According to our results, the effectiveness of forecasting techniques and the role of forecast in decision-making is positively moderated by uncertainty avoidance. Future orientation, instead, positively moderates the effect of manufacturing practices such as JIT, set-up time reduction and TQM on a company cost performance.

The findings discussed above have a set of implications for companies. The characteristics of the national culture should be considered, since mirror the people' attitude in performing tasks. By focusing on those manufacturing practices deemed successful in managing unforeseen demand, and mitigate the associated risks (e.g., stock-out and lateness in delivery), this article points out that managers should pay more attention towards those conditions that affect their ability to manage demand uncertainties and boot their cost performance. A structured forecasting process seems to be more beneficial in a cultural setting in which people strive to avoid uncertainty, vice-versa, flexibility enablers seem to be more suitable in a cultural environmental in which people is future oriented. It follows, that in a plant located in an uncertainty avoidance culture, managers can rely to a greater extent to

forecasting techniques to foresee future sales as well as to forecast in decision making. Employees are more prone to statistical analysis and to the scientific use of information; therefore, uncertainties and risk might be better managed. Differently, in future oriented ones, managers should rely the most on those manufacturing practices able to increase process flexibility; employees are more comfortable with a more "organic" structure, and to invest in JIT, TQM, and time reduction activities might be more successful in managing uncertainties.

Acknowledging as traced in Kull and Wacker (2010, p.25), the article can assist manager to highlight those cultural values that can foster or hinder the effectiveness of the investments in unforeseen demand hedge practices; therefore, managers can undertakes decisions that are consistent with the cultural setting in which the plant is located. Further, this study contributes to enhance the understanding about the contextual conditions that might affect the effective transferability and implementation of the manufacturing "best" practices across plants, with a narrow focus on those programs able to help companies to deal with the increased uncertainties and the most demanding customers, that characterize the actual economic environment.

The research is not exempt from limitations. Future studies might considering other cultural dimensions, for instance institutional collectivism, in-group collectivism and power distance, especially for what concern the role that information assume in the company's forecasting. For instance, the weak statistical significance associated to uncertainty avoidance, does not allow us to infer that the mentioned cultural trait consistently moderates the relationship between the use of different sources of information and the achieved efficiency performance. However, other cultural values, deliberately not considered in this study (e.g., institutional collectivism, in-group collectivism) might be relevant. Further research could shed a light on this issue. Finally, it would be interesting to understand if culture does influence the allocation of resources between a structured forecasting process and a flexible process to cope with uncertainties; in another words, if the choice regarding the adoption of the investigated unforeseen demand hedge practices is primarily influenced by the cultural environment in which the plant is located.

CHAPTER FIVE.
Concluding remarks

The overall aim of the dissertation, was to shed a light on the importance of national cultural values, for what concern the manufacturing area of companies. Specifically, in the era of international manufacturing, in which companies tend to act globally, understanding this issue has increased its relevance since, as noted throughout the dissertation, although globalization, cultural differences still arise and might be further amplified. It follows that a company, when decides to invest abroad, in a country that is different from its own, should understand the role of national culture values in affecting the way through which people act, in terms of their attitude and behavior, in order to manage their investments in a effective way and improve performance. In this sense, the dissertation provides several contributions, both from a theoretical perspective as well as from a managerial one.

5.1 THEORETICAL IMPLICATIONS

Theoretically, the dissertation enhances knowledge in the field of global manufacturing strategy and supply chain management, by relying on contingency theory. Firstly, by strengthening the contingent effect of the national culture characteristics, the dissertation shows how either the implementation, as well as the effectiveness of the manufacturing "best" practices change according to the context that a company is facing: specifically, to this end, the dissertation assumes a sequential perspective, according to which a company defines, first, how to compete in the market in terms of its priorities, then invests in manufacturing "best" practices, either internally as well as externally with its supply chain partners, the whole in a way that should be consistent both with the company's strategy as well as with the market requirements, in order to achieve a competitive advantage. In this regards, the first study, which deals with the companies' priorities, has shown how the most customer-oriented companies, in order to achieve this priority, might have recognized the relevance of the national cultural values: specifically, when investment in quality practices are applied, the cultural traits of individualism-collectivism, power distance and uncertainty avoidance are significant: as previous research has shown, an individualistic culture is less suitable to adopt quality practices (e.g., Flynn and Saladin, 2006). At the same time, to invest in quality practices, might be a strategy helpful to reduce issues tied to cultural values that, in a global context, might inhibit the company's competitiveness. In line with this, managers in power

distance culture, are less willing to communicate with the lower hierarchical levels: to invest in quality practices might be helpful in order to reduce this issue, fostering communication by enabling the access to informations, through standardization. At the same time, uncertainty avoidance culture, in order to strive with uncertainties and risks, tend to rely more on rules, norms and procedures: in this sense, to invest in quality practices means to invest in standardization, that might help to cope with anxiety and ambiguities to an uncertain future. As previously stated, customer-oriented companies, might have recognized these aspects and invested in manufacturing "best" practices coherently with the cultural values of the country in which the plant is located.

Further, the willingness of a company to invest externally, i.e. in collaboration with its supply chain partners in manufacturing "best" practices, might be undermined or fostered by cultural values. The second study has tried to focus its attention on those factors that might enable supply chain integration, by considering cultural values. Specifically, the study has shown how in a country in which people perceive differences in hierarchical levels, is comfortable when decision are taken from the most powerful members in societies, and, at the same time, tend to primarily pursue the group's goals rather than their own, a company is more willing to invest in the sharing of information regarding, for instance, inventory levels and production plans either with its customers and suppliers. In this sense, several suggestion are drawn: firstly, power distance seem to be the more relevant cultural value that drives a manufacturer to invest in the sharing of information, either with its customers and suppliers. Specifically, due to the high power distance, a manufacturer will be more amenable to the customer's power, both in terms of coercion, as well as of reward and expertise. Therefore, a company located in a culture with a vertical collectivistic configuration (i.e. high power distance and low individualism-collectivism), seem to be more willing to apply investment in information sharing either with its customers and suppliers.

Thirdly, the issue concerning how national cultural values might foster or hinder the effectiveness of the manufacturing "best" practices is considered; by looking to forecasting and flexibility, i.e. those manufacturing practices that have been deemed as a suitable to strive with uncertainties and risks. The role of two specific cultural traits is considered: uncertainty avoidance and future orientation. These cultural characteristics have been chosen since they might underline those values that could drive people's behavior in terms of how risks and uncertainties are perceived. In a uncertainty avoidance culture, invest in a structured forecasting process might be more effective in improve the level of the companies' cost

performance: at the same time, in a cultural environment in which people is more future oriented, i.e. tend to delay immediate gratification, in the light of future returns, to invest in flexibility enablers (e.g., JIT, time reduction practices) might be more effective in help companies to reduce their manufacturing cost, increasing, as a consequence, the related performance.

5.2 MANAGERIAL IMPLICATIONS

From a managerial perspective, the suggestion traceable throughout the dissertation, is that managers should recognize that what could be effective in one context might not be so in another. Specifically, this suggestion is relevant in a world in which uncertainties are increased and customers have become more demanding. Moreover, the increasing globalization has brought companies to open facilities and subsidiaries abroad; it follows, that people's cultural interactions are amplified. Therefore, recognize the effects of cultural values on how manufacturing "best" practices are managed in different contexts, might help companies to improve their competitiveness in the current economic environment. The same suggestion is relevant in relation to the companies' decision making; in this sense, the thesis suggests how cultural values should be considered, in order to put in place the right decisions for the right place. Further, how to transfer effectively the manufacturing "best" practices across countries, is one of the central thought of the dissertation. In this sense, managers should be aware that the investments in manufacturing "best" practices should be adherent with the cultural peculiarities of the country in which the plant is located.

Overall, the abovementioned considerations should help companies to highlight those national cultural peculiarities that might foster or hinder the effective implementation and transferability of the manufacturing "best" practices, a suggestion that could become relevant when companies take their operational decisions.

5.3 LIMITATIONS AND FUTURE RESEARCH

Lastly, limitations are advanced. The main limitation of the dissertation is traceable in the fact that the research questions of each article are addressed using data gathered through international surveys. Although relying on surveys is been deemed as a suitable approach in order to test the research hypothesis of the dissertation, due the thesis's aim to compare manufacturing "best" practices across countries, it's perceived as weakness since results are not strengthened by different methodologies. What would be interesting carry out, and future

research could do it, are case studies in order to provide a methodological triangulation, adding to the results drawn from surveys those of case studies, giving, as a result, a more wide understanding of the role of national cultural characteristics for what concern the manufacturing area of companies.

Further, the thesis focuses on manufacturing industry. However, future research should also considered the role of national culture for what concern how operations are managed in the field of services.

The last limitation regards how culture has been considered. Specifically, the dissertation has considered culture in terms of national culture and, more in the detail, it was treated as a pervasive phenomenon that might affect organizations and specifically how the manufacturing practices are managed and goals are achieved. Future studies, might consider the role of culture in a more deeply perspective, looking to the "corporate" culture that characterize each companies.

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