UNIVERSIDADE DE SÃO PAULO
ESCOLA DE ENGENHARIA DE SÃO CARLOS
DEPARTAMENTO DE ENGENHARIA DE PRODUÇÃO

Relações entre dimensões culturais e sistemas de planejamento e controle da produção

João Paulo Ferrarez Borin

São Carlos

2010

UNIVERSIDADE DE SÃO PAULO
ESCOLA DE ENGENHARIA DE SÃO CARLOS
DEPARTAMENTO DE ENGENHARIA DE PRODUÇÃO

Relações entre dimensões culturais e sistemas de planejamento e controle da produção

João Paulo Ferrarez Borin

Trabalho de Conclusão de Curso apresentado à Escola de Engenharia de São Carlos da Universidade de São Paulo, para obtenção do título de Graduação em Engenharia de Produção Mecânica.

Orientador: Prof. Dr. Fernando César Almada Santos

São Carlos

2010

RESUMO

Embora práticas comuns de Planejamento e Controle da Produção (PCP) são cada vez mais utilizadas em organizações de todo o mundo, pouco esforço tem sido empregado na busca pela influência de aspectos culturais nos sistemas de Planejamento e Controle da Produção. Esse estudo apresenta uma visão geral da transferência global dos sistemas de Planejamento e Controle da Produção e uma revisão bibliográfica sobre cross-cultural management e dois dos principais modelos de dimensões culturais. Os resultados mostram como as dimensões culturais Distância do poder, Aversão à incerteza, Individualismo/coletivismo, Masculinidade/feminilidade e Tempo seqüencial/sincrônico influenciam os aspectos de configuração funções, objetivos e responsabilidades de um sistema de PCP.

Palavras-chave: Planejamento e Controle da Produção, Cultura nacional, Cross-cultural management

ABSTRACT

Although common Production Planning and Control (PPC) practices and approaches have been increasingly applied in companies all around the world, little effort have been spent in finding out how cultural aspects influence PPC systems. This study presents an overview of the global transfer of Production Planning and Control systems, the cross cultural management literature and the two multiple dimension models for national culture which have gained more emphasis so far. The results show how the cultural dimensions Power distance, Uncertainty avoidance, Individualism/collectivism, Masculinity/femininity and Sequential/synchronous time influence the configuration aspects PPC objectives, PPC responsibility and PPC functions.

Keywords: Production Planning and Control, National Culture, Cross-cultural management.

LIST OF FIGURES

LIST OF TABLES

LIST OF CONTENTS

1. Introduction

1.1. Problem Statement

In an era of a ‘‘flattening world’’, the transfer of global management practices have been increasing. The number of companies which start new business abroad increases each day and, with that, the belief that practices that work well in one country can be exported to another (FRIEDMAN, 2005).

There are lots of examples of global practices which the scope of application was made worldwide, such as JIT, TQM and so on. These practices helped to improve companies' performance worldwide and, since that, scholars have been striving to find general practices to fit companies' requirements without thinking about cultural differences.

Authors such as Schwartz (1994), Naor et al. (2009), Flynn (2009) and Metters (2010) investigate the impacts of cultural dimensions on manufacturing performance and activities, and conclude that these dimensions influence, in some extension, both manufacturing performance and activities. While the best practices might be shared globally (homogenized), this might provoke local cultural conflicts. Sharing best practices globally could potentially be problematic if they conflict with national cultural values (NAOR et al., 2009). The basic premise is that operations management decisions may need to take culture into account: some operations management practices are altered or precluded by culture, while others are more effective in some cultures than others (METTERS, 2010).

Over the last three decades, several scholars have developed frameworks for measuring the dimensions of national culture (HOFSTEDE, 2001; HOUSE et al., 2004; SCHWARTZ, 1994; SMITH, 2006). Nevertheless, the literature lack researches on the influence of culture on production management activities (METTERS, 2010).

Metters (2010) highlights specific areas on which cultural influences still need to be examined: facility location, capacity, productivity, forecasting, scheduling, aggregate planning and inventory control. It is noticeable that most of these areas encompass Production Planning and Control (PPC) activities.

Indeed, the global transfer of PPC systems is currently of great importance. PPC systems and principles are implemented in many countries without regards to contrasts between cultures. Many companies still have difficulties to meet its logistic performance objectives and it can occur due to incoherence between the configuration of the PPC system and culture aspects. PPC systems cannot be exported to other countries without considering some culture aspects.

For that reason, this study investigates how cultural dimensions impact the implementation of PPC systems and which aspects of this relation must be considered in which way. Therefore, this study aims to answerer the following question: What is the role of culture in the implementation of Production Planning and Control systems?

1.2. Objectives

This study aims to answer the question stated above. The main purpose is to identify which cultural aspects can influence which PPC system activities. It can be achieved through the following specific objectives:

- Provide an overview of the cultural dimensions proposed by different authors and its impacts on management;
- Identify cultural aspects that can influence PPC systems;
- Review the literature of Production Planning and Control;
- Identify the global transfer of PPC systems;
- Investigate which cultural aspects can impact which PPC system activities.

1.3. Study design

This topic describes the structure of this study. It is divided into Introduction, Literature Review, Methodology, Results and Discussion, Conclusion and References.

Chapter 2 presents a review of the relevant literature of Cross-cultural management and Production Planning and Control system.

Topic 2.1 provides a review of the cross-cultural management literature to provide an overview of what have already been done on the impact of culture on management in different areas, such as quality management, manufacturing performance, operations management, manufacturing strategy and logistic.

Topic 2.2 provides an overview of the two most used constructs of cultural dimensions, Hofstede's cultural dimension and Trompenaars' cultural dimensions.

Topics 2.3 and 2.4 present an overview of the Production Planning and Control literature as well as a description of the global transfer of PPC systems.

Chapter 3 presents the description of the Methodology used in this study. It is explained how the objective of the study was achieved.

Chapter 4 refers to the Results and Discussion of the study. It is defined, in this chapter, the cultural dimensions on which the work was based and, afterwards, how each of this dimensions impact the selected Production Planning and Control configuration aspects.

Chapter 5 presents the conclusion and final considerations of the author and Chapter 6 includes the references used.

2. Literature Review

2.1. The role of culture on management practices

Hofstede (2001, p. 9) defines culture as "the collective programming of the human mind that distinguishes the members of one human group from those of another", developed as a result of the shared experiences of inhabitants of a nation, including educational, governmental and legal systems, family structure, religious patterns, language, literature, architecture and scientific theories. Culture in this sense is a system of collectively held values (HOFSTEDE, 2001).

The members of a culture share a set of ideas, values, or broad preferences for certain states of affairs, such as what is considered good/evil, beautiful/ugly, rational/silly and normal/abnormal (HOFSTEDE, 2001). For instance, Americans believe they can have a strong impact on their immediate circumstances, while members of other national cultures believe that their circumstances are more strongly determined by fate, a deity, luck, government, social class or history (FLYNN, 2006). These values are transmitted (particularly from one generation to another) by symbols. Therefore, culture is produced by the past of a group and its members.

Due to the economic importance of the United States after the Second World War, in the 1950 and 1960 decades most of the theories and practices developed in the management field followed the American culture. The same happened after the rise of Japan as an economic power. Nevertheless, both Japan and American cultures differ from other cultures in many aspects (HOFSTEDE, 2001). As a consequence, lots of studies have been trying to find out how different national culture aspects can impact business management. A collection of some of the articles and also a brief description of them can be found on

Field	Author and year	Title	Brief description
Quality Management	Kull, 2009	Quality management effectiveness in Asia: The influence of culture.	Uses GLOBE cultural dimensions to exploit which cultural aspects are positively or negatively related to quality management effectiveness.
	Flynn, 2006	Relevance of Baldrige constructs in an international context: A study of national culture.	Uses Hofstede's dimensions of national culture to examine whether the theoretical constructs underlying the Baldrige criteria are relevant across national cultures.
	Yoo et al., 2006	A comparative study on cultural differences and quality practices – Korea, USA, Mexico, and Taiwan	Uses Power distance and Collectivism Hofstedes' cultural dimensions to find how culture impacts employee empowerment and how employee empowerment impacts quality results.
	Mathews et al., 2001	European quality management practices: The impact of national culture	Uses the dimensions uncertainty avoidance and power distance (HOFSTEDE, 2001) and diffuse/specific and affective/neutral (TROMPENAARS, 2003) to explain observed differences between countries in motivation for implementing a quality system and quality tools and techniques used.
	Vecchi, 2009	Quality management: a cross-cultural perspective.	Uses Hofstedes' cultural dimensions to examine if there is a difference in quality priorities, practices and performance across national cultures and concludes that quality practices and quality performance tend to vary very significantly across the all four dimensions of culture.
Manufacturing performance	Naor et al., 2009	The globalization of operations in Eastern and Western countries: Unpacking the relationship between national and organizational culture and its impact on manufacturing performance.	Uses GLOBE cultural dimensions to investigate whether organizational culture in plants differs across countries and how it relates to national culture. The study concludes that all of the 9 dimensions proposed by GLOBE framework have some positive or negative effects on manufacturing performance.
	Metters, 2009	''The way that can be told of is not an unvarying way'': Cultural impacts on Operations Management in Asia.	Investigates the impacts of national culture on operation management (OM) in Asia and presents examples of specific OM decisions affected by Asian culture.
Operations management	Katz, 2005	The importance of national culture in operations management research.	Uses Hofstedes' cultural dimensions to examine the role that national culture plays on decisions to export products, sales forecasts, the number of outsource relationships and the purchase of production inputs rather than the manufacture of them.

	Harrison et al., 1994	The Influence of Culture on Organizational Design and Planning and Control in Australia and the United States Compared with Singapore and Hong Kong	Uses Hofstede's cultural dimensions power distance, individualism and long/ short term orientation to predict and explain differences in philosophies for, and approaches to organizational design and management planning and control systems in Australia and the US.
	Wacker et al., 1998	Forecasting accuracy: comparing the relative effectiveness of practices between seven developed countries	Investigates forecasting practices in seven developed countries to determine the differences among managerial behaviors that affect forecast accuracy.
Manufacturing strategy	Blackmon, 1998	Differences in manufacturing strategy decisions between Japanese and Western manufacturing plants: the role of strategic time orientation	Analyses how a Monochronic versus polychronic view of time and a short versus long time orientation, which are the basic differences in time orientation between the Japanese and the wetern countries, influence the development of manufacturing strategies.
Logistic	Aquilon, 1997	Cultural dimensions in logistics management: a case study from the European automotive Industry	Based on the results of a qualitative study based on 50 in-depth interviews with Volvo Car Corporation's European suppliers and Hofstede's cultural dimensions, finds differences related to organizational structure, access to information, communication style and the degree of assertiveness towards customers.

Table 1- Some studies on the impact of National Culture on management

Some authors have also investigated the influence of cultural aspects on different leadership characteristics and have shown that different cultures have different perception of what is a good leader and the role of them in the organization environment (LAURENT, 1989; HOUSE, 2004, SCHEIN, 1985).

Accordingly, there are differences between management practices, decision-making strategy and outcomes in different countries, due to different cultural aspects. Hence, the comprehension of cultural influences on management shows that the idea of universal administrative theories should be taken with caution. Nevertheless, although there are strong evidences that culture can affect specific organizational outcomes, very little effort has been devoted to assess the impact of culture on Production Planning and Control systems.

2.2. How culture differ: Cultural dimensions

Traditionally, there have been two main different approaches for studying the impact of national culture on management practices: "convergence" hypothesis, "culture specific" hypothesis.

The “convergence” hypothesis is based on the premise that organizations can alter the behavior of people and undermine the effects of national culture (NAOR, 2009). Therefore, management practices tend to be equalized world-wide and companies tend to be more alike. According to this hypothesis, the organizational culture plays an important role in altering staff behavior according to their conveniences.

The “culture specific” argument (HOFSTEDE, 2001) is based on the premise that there are no universal solutions to organizations and management problems and as a result organizational practices must be adapted to the national context to maximize its effectiveness. Hence, ‘‘even if organizations located within different societies do face similar contingencies and adopt similar models, deep-rooted cultural forces will still re-assert themselves in the way people actually behave and relate to each other’’ (HOUSE et al, 2002, p. 3).

In the context of the “culture specific” argument, over the past 20 years international management researches have successfully linked national cultures to cross-cultural business behaviors (HOFSTEDE, 2001; TROMPENAARS, 1999). In the following sections, two multiple dimension models for national culture which have gained more emphasis will be presented, Hofstede’s and Trompenaars’s cultural dimension.

2.2.1. Hofstede’s cultural dimensions

Hofstede (2001) says that global solutions to organization and management problems don’t exist. He argues with empirical support that generally accepted U.S. theories such as of Maslow, Herzberg, McClelland, Vroom, McGregor, Likert, Blake and Mouton might not apply outside the U.S. According to him, “management scientists (…) grew up in particular societies in particular periods, and their ideas cannot but reflect the constraints of the environment they have known” (HOFSTEDE, 2001, p. 374). The success of businesses in East Asian countries that very evidently did not follow most of the generally accepted U. S. theories has supported his conclusions. Nevertheless, he emphasizes that the lack of universal solutions to management and organizations problems does not mean that countries cannot learn from one another. He says that looking across the border is one of the most effective ways of getting new ideas for management, organization, or politics. However, the transfer of these ideas across borders requires prudence and judgment (HOFSTEDE, 2001).

Hofstede’s work on national culture is the most used theoretical framework for guiding cross-cultural comparisons. Based on a study carried out with IBM staff over 50 countries, he identified five dimensions of national cultures: Power distance, individualism/collectivism, Uncertainty avoidance, masculinity/femininity and Long- Versus Short- Term Orientation

(HOFSTEDE, 2001). He argues that the culture of a country is not a combination of properties of the "average citizen". He says that one person from one culture can react in a way while another person can react in another way, but both actions can be manifestations of a common cultural tendency.

Power distance is related to the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally. On one hand, cultures with high power distance tend to accept centralized power and depend heavily on superiors for structure and direction. On the other hand, cultures with low power distance do not tolerate highly centralized power and at least expect to be consulted in decision making (HOFSTEDE, 2001). Hofstede (2001) says that in low power distance countries, power is something of which power holders are almost ashamed, and that they will try to underplay. Table 2 shows different work organization characteristics which Hofstede has found related to Power Distance dimension.

Low Power Distance	High Power Distance
Decentralized decision structures; less concentration of authority	Centralized decision structures; more concentration of authority
Flat organization pyramids	Tall organization pyramids
Small proportion of supervisory personnal	Large proportion of supervisory personnel
Hierarchy in organizations means an inequality of roles, established for convenience	Hierarchy in organizations reflects the exitential inequality between higher-ups and lower-downs
The ideal boss is resourceful democrat, sees self as practical, orderly, and relying on support	The ideal boss is well-meaning autocrat or good father; sees self as benevolent decision maker
Managers rely on personal experience and on subordinates	Manager rely on formal rules
Subordinates expect to be consulted	Subordinates expect to be told
Consultative leadership leads to satisfaction, performance, and productivity	Authoritative leadership and close supervision lead to satisfaction, performance, and productivity
Subordinate-superior relations pragmatic	Subordinate-superior relations polarized, often emotional
Subordinates influenced by bargaining and reasoning; MBO is feasible	Subordinates influenced by formal authority and sanctions; MBO cannot work
Managers involved in relevant purchasing decisions	Managers not involvedd in relevant purchasing decisions
Innovations need good champions	Innovations need good support from hierachy
Narrow salary range between top and botton of organization	Wide salary range between top and botton of organization

Possibility to escape from role ambiguity and overload	Frequent role ambiguity and overload
Openness with information, also to nonsuperiors	Information constrained by hierarchy
Manual work same status as clerical work	White-collar jobs valued more than blue-collar jobs

Table 2 - Key differences between Low- and High- Power Distance Societies: Work Organization
Source: Hofstede (2001, p 107)

Lots of studies can be found in the literature to reinforce and enlarge Hofstede's findings on how Power Distance impact management practices. Swan (2007) and Brian (2007) found that cultures which rate high in power distance tends to emphasize central planning and hierarchical control and that in these cultures there is an emphasis on internal co-ordination with a clearly higher emphasis put on attempting to optimize the resource utilization (SWAN et al., 2007). Malin (1997) argues that in small power distance cultures initiatives from blue collar workers and subordinates are common and expected and that employee empowerment is facilitated.

Individualism/collectivism describes the degree to which people are oriented toward acting as individuals versus acting as part of a group. High individualism rate indicates that individuals of this culture tend to act according to their own interests, seeking individual success and achievements. Low individualism rate indicates that individuals would rather work as member of a group and their performance increases when they work as a member of a group rather than on their own (HOFSTEDE, 2001). This dimension is also associated to relational behavior, because for people in collectivistic cultures, the personal relationship prevails over the task, while for people in individualist cultures the opposite occurs. In collectivist cultures there are special emphasis on norms concerned with loyalty to the group and a cooperative atmosphere emerge from teamwork. Teamwork in individualist cultures usually present competitive atmosphere. A summary of the main differences found in cultures with high individualism and low individualism indices is shown on Table 3.

Low Individualism	High Individualism
Management is management of groups	Management is management of individuals
Employee has to be seen in family and social context	Employee has to be seen as individual
Keeping ethnic or other in-groups supports productivity	Composition of work groups based on individual criteria; in-groups unwanted
Incentives to be given to in-groups	Incentives to be given to individuals
Direct appraisal of performance is a threat to harmony	Direct appraisal of performance improves productivity
Hiring and promotion decisions take employees' in-group into account	Hiring and promotion decisions should be based on skills and rules only
Poor performance reason for other tasks	Poor performance reason for dismissal
Employees perform best in-groups	Employees perform best as individuals
Training most effective when focused at group level	Training most effective when focused at individual level
Relationships with colleagues cooperative for in-groups members, hostile for out-group	Relationships with colleagues do not depend on their group identity
Treating friends better than others is normal and ethical: particularism	Treating friends better than others is nepotism and unethical: universalism
In business, personal relationships prevail over task and company	In business, task and company prevail over personal relationship
Organizational success attributed to sharing information, openly committing oneself, and political alliances	Organizational success attributed to withholding information, not openly committing, and avoiding alliances
Belief in collective decisions	Belief in individual decisions
Less control over job and working conditions, fewer hours worked	More control over job and working conditions, longer hours worked
More importance attached to training and use of skills in jobs	More importance attached to freedom and challenge in jobs
Qualification for jobs in terms of years of schooling	Qualifications for jobs in terms of performance at previous tasks

Table 3 - Key differences between Low- and High- Individualism Societies: Work Organizations
Source: Adapted from Hofstede (2001)

Comparing the findings over individualism/collectivism and power distance, Hofstede (2001) found that these two dimensions are related in a way that, usually, collectivist cultures show high power distance while individualist cultures show small power distance.

Uncertainty avoidance is related to the degree to which people within a culture are made uncomfortable by situations they perceive to be unstructured, unclear or unpredictable, causing them to adopt strict codes of behavior and a belief in absolute truths. Individuals in low uncertainty avoidance culture tend to be relatively tolerant toward uncertainty and

ambiguity and require considerable autonomy and lower structure truths. Cultures with high uncertainty avoidance rate have an emotional need for rule, creating institutions to promote security and minimize risk (HOFSTEDE, 2001). Work norms in cultures with high uncertainty avoidance usually are more rigid, with less scope for different interpretation. Moreover, teamwork in the context of high uncertainty avoidance present preference for agenda and to strict follow it, structured discussions and clear outcome while in the context of low uncertainty avoidance there is a preference for informality. The main differences found in cultures with high Uncertainty avoidance and low Uncertainty avoidance indices is shown on Table 4.

Low Uncertainty Avoidance	High Uncertainty Avoidance
Emotions have to be controlled	Expression of emotions normal
Facial expressions of sadness and fear easily readable by others	Nature of emotions less accuratly readable by others
Less hesitation to change employers	Tendency to stay with same employers
Lower average seniority in jobs	Hogher average seniority in jobs
Company loyalty is not a virtue	Company loyalty is a vitue
Admit dissatisfaction with employers	Don't admit dissatisfaction with employers
More ambitions for advancement and management positions	Lower ambitions for advancement and preference for specialist positions
Individual decisions, authoritative management, and competition among emploees acceptable	Ideological preference for froup decisions, consultative management, against competition among employee
Favorable attitudes toward younger people; smaller generation gap	Critical toward younger people; large generation gap
Less ressistance to change	More resistance to hange
Acceptance of foreigners as managers	Suspicion of foreigners as managers
Weak loyalty of employer; short average duration of employement	Strong loyalty to employer, long average duration of employment
Skepticism toward technological solutions	Strong appeal of technological solutions
Innovators feel independent of rules	Innovators feel constrained by rules
Top managements involved in strategy	Top management involved in operations
Tolerance for ambiguity in structures and procedures	Highly formalized conceptions of management
Apeal of transformational leader role	Appe of hierarchical control role
Innovation welcomed but not necessarily taken seriously	Innvation resisted but, if accepted, applied consistently
Precision and punctuality have to be learned and managed	Precision and punctuality come naturally
Relationship orientation	Task orientation
Flexible working hourss not appealing	Flexible working hours popular

Belief in generalist and common sense	belief in specialist and expertise
Superiors optimistic about employees' ambitions and leadership capacitites	Superiors pessimistic about employees' ambition and leadership capacities
Hope for succes	Fear for failure
Preference for tasks with uncertain outcomes, calculated risks, and requiring problem solve	Preference for tasks with sure outcome, no risk, ans following instructions

Table 4 - Key differences between Low- and High- Uncertainty Avoidance Societies: Work Organizations
Source: Adapted from Hofstede (2001)

It can be seen that the uncertainty avoidance dimension correlates with precise instructions, detailed job descriptions, formalization, precise answers and factual information as the basis of managerial decisions. Cultures with high uncertainty avoidance rate tend to choose documented systems and management-by-fact approaches with systematic process and job descriptions (SWAN, 2007; MATHEWS, 2001; AQUILON, 1997).

Masculinity/femininity describes the extent to which aggressiveness and success are valued versus concern for relationships. The study highlights that women's values differ less among societies than men's values. “Men's values from one country to another contain a dimension from very assertive and competitive and maximally different from women's values on the one side, to modest and caring and similar to women's values on the other” (HOFSTEDE, 2001, p. 280). The assertive pole has been called 'masculine' and the modest, caring pole 'feminine'. The women in feminine countries have the same modest, caring values as the men. In the masculine countries they are somewhat assertive and competitive, but not as much as the men, so that these countries show a gap between men's values and women's values (HOFSTEDE, 2001). Table 5 shows the main differences between high and low masculinity in work organization context.

Low Masculinity	High Masculinity
Small gender culture gap	Large gender culture gap
Larger share of women in professional and technical jobs	Smaller share of women in professional and technical jobs
Meaning of work for workers: relations and working conditions	Meaning of work for workers: security, pay, and interesting work
Managers are employees like others	Managers are culture heroes
Managers expected to use intuition, deal with feeling, and seek consensus	Managers expected to be decisive, firm, assertive, aggressive, competitive, just
Smaller wage gap between genders	Larger wage gap between genders
Managers less prepared to uproot their families for career reasons	Managers more prepared to uproot their families for career reasons

Humanization of work through creation of groups	Humanization of work through provision of task challenge
Resolution of conflicts through problem solving, compromise, and negotiation	Resolution of conflicts through denying them or fighting until the best "man" wins
Lower job stress	Higher job stress

Table 5 - Key differences between Low- and High- Masculinity Societies: Work Organizations
Source: Adapted from Hofstede (2001)

Long- Versus Short- Term Orientation is independent from the four previews dimensions. This new dimension was found in a study among students from 23 countries around 1985 using a questionnaire designed by Chinese scholars. Hofstede (2001) says that the fact that this dimension was not found in the IBM data can be attributed to the western minds of the designers of the IBM questionnaire and other values lists used in international research so far. The dimension expresses to what extension virtuous living is a goal, independent of any religious justification and is related to the ability to solve well-defined problems, as evidenced by secondary school performance levels in basic mathematics. Values associated with Long Term Orientation are thrift and perseverance and values associated with Short Term Orientation are respect for tradition, fulfilling social obligations, and protecting one's "face". Table 6 shows some different characteristics between Long- and Short- Term Orientation societies.

Low LongTerm Orientation	High Long Term Orientation
Quick results expected	Persistence, perseverance
Status not major issue in relationships	Relationships ordered by status and this order observed
Shame is not a common feeling	A sense of shame common
Respect for traditions	Adaptation of traditions to new circumstances
Leisure time importante	Leisure time not so important
Most important events in life occurred in past or occur in present	Most important events in life occur in future
Living with in-laws is a problem	Living with in-laws is no problem
In business, short-term results: the botton line	In business, building of relationships and market position
Analytic thinking	Synthetic thinking
Probabilistic thinking	Either full or no confidence

Table 6 - Key differences between Long- and Short- Term Orientation Societies
Source: Adapted from Hofstede (2001)

2.2.2. The role of some Hofstede's cultural dimensions in functioning of organizations, planning, control, compensation and empowerment

According to Hofstede (2001), organizations are symbolic entities, so they are organized according to implicit culturally determined models that are in the minds of their members. He argues that *power distance* and u*ncertainty avoidance* are the most important cultural dimensions to describe the functioning of organizations. Thus, he relates the five types of organization structures defined by Mintzberg (1983) to power distance and uncertainty avoidance dimensions. Mintzberg (1983) define five distinct parts for organizations: the operating core (the people who do the work); the strategic apex (the top management); the middle line (the hierarchy in between); the technostructure (people in staff roles supplying ideas) and the support staff (people in staff roles supplying services). There are five mechanisms for coordinating activities: mutual adjustment (of people through informal communication); direct supervision (by hierarchical superiors); standardizing of work processes (specifying the content of work); standardizing of outputs (specifying the desired results) and standardizing of skills (specifying the training required to perform the work). At last, Mintzberg (1983) argues that there are five common configurations for organizations: the simple structure (with strategic apex as the key part and direct supervision as the coordinating mechanism); full bureaucracy (technostructure as the key part and standardizing of work processes as the coordinating mechanism); the professional bureaucracy (the operating core as the key part and standardizing of skills as the coordinating mechanism); the divisionalized form (middle line as the key part and standardizing of outputs as the coordinating mechanism) and the adhocracy (support staff and sometimes the operating core as key part and mutual adjustment as coordinating mechanism). The findings of these relations can be seen on Figure 1.

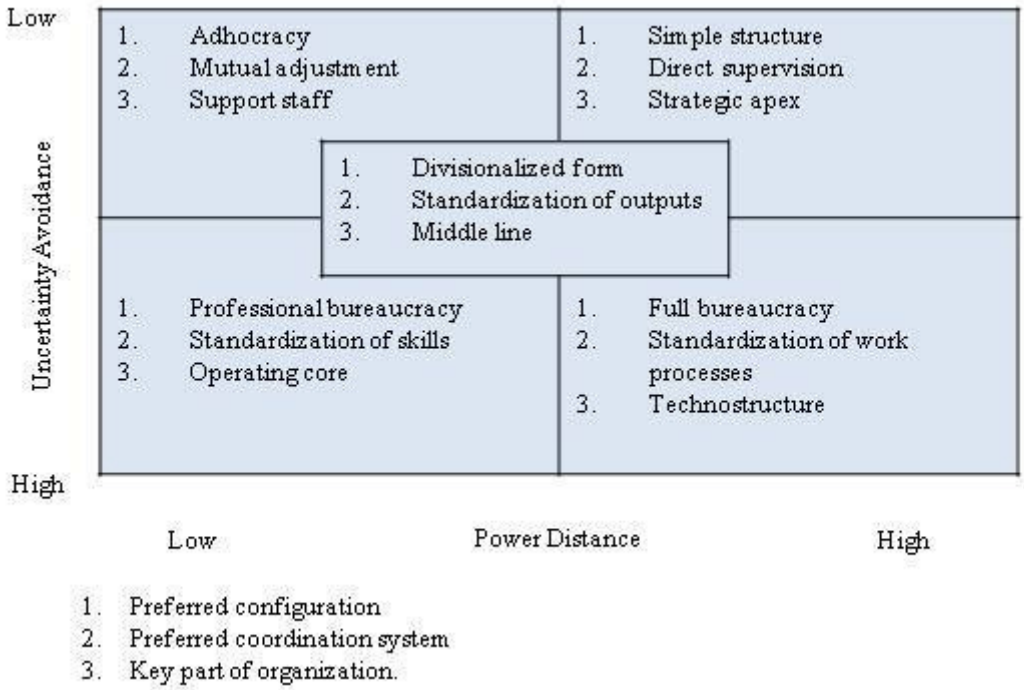

Figure 1 - Relationship between Mintzberg's preferred configurations and the dimensions Power distance and Uncertainty avoidancy
Source: Hofstede (2001, p 377)

Besides the findings on functioning of organizations, Hofstede has also investigated the role of power distance and uncertainty avoidance in planning and control systems. According to Hofstede (2001), planning represents an attempt to reduce uncertainty and control implies the exercise of power. Hence, it should be no surprise that planning and control process in organizations reflect basic cultural assumptions, and that they are related to power distance and uncertainty avoidance norms of the dominant national culture. Planning and control systems imply norms on organizations, and these norms reflect the diffuse norms within people's mental program. He suggests that:

- Higher power distance supports "political" rather than "strategic" planning;
- Higher power distance supports personal planning and control rather than impersonal systems. The higher in the hierarchy, the less formal the planning and control;
- Lower power distance control systems place more trust in subordinates; in higher power distance cultures such trust id lacking;
- Higher uncertainty avoidance makes it less likely that strategic planning activities are practiced, because these may put questions marks to the certainties of today;

- Higher uncertainty avoidance supports a need for more details in planning and more short-term feedback;
- Higher uncertainty avoidance implies leaving planning to specialists;
- Higher uncertainty avoidance implies a more limited view of relevant information.

By means of comparisons between compensations package between countries with different indices of cultural dimensions, Hofstede found the following correlation between some cultural dimension and compensations:

- Power Distance Index (PDI) is negatively related to workplace child care for managers, professionals, and technical staff, and to nonmanagerial employee stock options and ownership.
- Uncertainty Avoidance Index (UAI) is positively related to pay based on seniority and skill and negatively related to pay based on performance;
- Individualism Index (IDV) is positively related to pay for individual performance and to stock options and ownership for managers;
- Masculinity Index (MAS) is positively related to payment of commission to nonmanagerial employees and negatively related to flexible benefits, workplace child care for clerical and manual workers, and maternity leave.

Finally, Hofstede (2001) relates empowerment to some of his cultural dimensions. Empowerment applies all kinds of formal and informal means of sharing decision making power and influence between leaders and subordinates. Hence, the first cultural dimension which has an impact on empowerment is power distance, due to the relation between subordinates and leaders. Distributing influence comes more naturally to low than high power distance cultures. Moreover, the chance and opportunities for more formal or informal empowerment are also affected by uncertainty avoidance. Therefore, taking both power distance and uncertainty avoidance into account, four different characteristics for empowerment can be found, in order to fit each of the quadrants of Figure 1. When power distance and uncertainty avoidance are both low there is a stress on informal and spontaneous forms of participations on the shop floor. When power distance is low, but uncertainty avoidance is high, the stress is on formal, legally determined systems. When power distance is high and uncertainty avoidance is either high or low, distributing power is a contradiction. In these case, distributing power must be pushed by a powerful leader such as “an enlightened entrepreneur in high power distance low uncertainty avoidance countries, or by political

leadership using legislative tools in high power distance, high uncertainty avoidance countries" (HOFSTEDE, 2001, p. 389).

2.2.3. Hampden-Turner and Trompenaars cultural dimensions

According to these authors, culture is a matter of how problems are solved. Trompenaars (2003) argues that individuals can only be aware of cultural differences by understanding themselves, and that they can only understand themselves through others. He explains his thought talking about his experiences abroad and says that "it is about basic assumptions that we normally take for granted and suddenly you realize that, in other cultures, your obvious solutions don't work or are not appreciated" (TROMPENAARS, 2003).

Hampden-Turner and Trompenaars (1999) examination of national culture was accomplished by a ten-year study examining the responses of over 15,000 managers from 23 countries. His research approach identified 7 cultural dimensions, which are divided in three categories:

- People orientation: universalism versus particularism; individualism versus communitarianism; neutral versus affective; achievement versus ascription and specific versus diffuse relationships
- Time orientation: sequential versus synchronous time;
- Environmental orientation: inner versus outer-directed locus of control.

Universalism versus particularism defines how individual judge other people behavior. Universalism rests on the premise that ideas and practices can be applied everywhere and in every context without modification. Particularism is the belief that situational factors and circumstances should dictate how ideas and practices should be applied. Universalist cultures insist on the ubiquitous following of procedures and contracts. Particularistic cultures are less concerned with rules, and tend to focus more on relationships and trust (KALE, 2008).

Individualism versus communitarianism analyses if the individual is oriented either to his own interests or to common objectives of his community. Is related to Hofstede's dimension Individualism/collectivism in the sense that asses if the individual would rather work by his own or as member of a group (GONÇALVES, 2009).

Neutral versus affective is related to the predominance of rationality or emotion in the interpersonal relations. In a neutral culture, individuals do not reveal what they fell or think and lack physical contact, gesturing or strong facial expressions. An affective culture is

characterized by nonverbal and verbal display of thoughts and feelings transparency and expressiveness in release of tensions (GONÇALVES, 2009).

Achievement versus ascription is related to how individuals acquire status. In achievement-oriented cultures status are awarded based on accomplishments as a function of their performance (what people do). Ascription oriented cultures, on the other hand, ascribe status based largely on who or what a person is (GONÇALVES, 2009).

Specific versus diffuse relationships. In specific cultures, the personal and professional lives of the individuals are disconnected. In diffuse cultures the personal and professional lives of the individual tends to be mixed. For instance, in specific oriented cultures the manager keep his personal relation with his subordinates apart from the professional relation while in diffused cultures the manager tends to be involved in several aspects of his subordinates lives (GONÇALVES, 2009).

Sequential versus synchronous time analysis the importance of past, present and future for different cultures. The vision an individual has of time can be either sequential or synchronous. Cultures with a sequential approach to time tend to perform only one activity at one point in time. They value punctuality in appointments and evince a strong preference for following plans. In cultures where a synchronous approach is common, people tend to engage in more than one activity at a time, appointments are less stringently adhered to, and schedules are subordinated to relationships (GONÇALVES, 2009).

Inner versus outer-directed locus of control. People in inner-directed cultures believe they are in control of the outcomes of their actions. People in outer-directed cultures place less emphasis on their own actions and let things take their own course. Inner-directed people strive to control their environment whereas outer-directed people believe that they are controlled by their environment and that they cannot do much about it (KALE, 2008).

2.3. Production Planning and Control system: Overview

Every organization has at least one production system, which involves a transformation process. “Process” refers to the conversion of inputs (resources) into outputs (goods and services). Figure 2 shows a basic transformation process model.

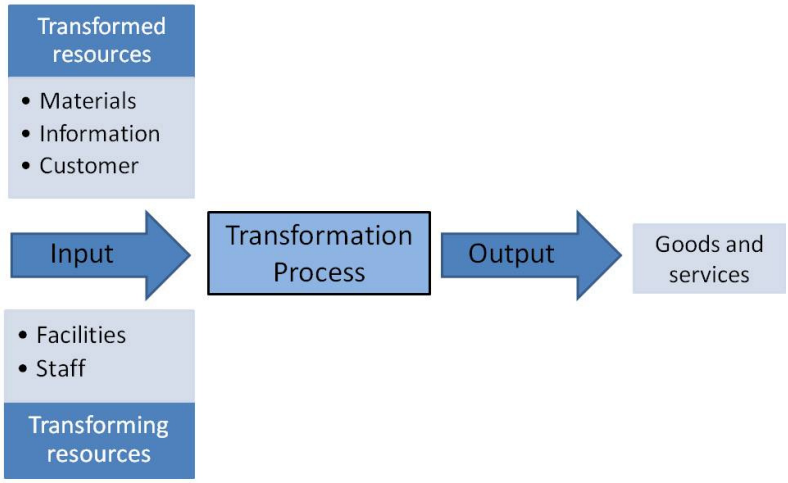

Figure 2 - Transformation process models
Source: Slack et al. (1999)

According to this model, the transformation process model consists of an input, the transformation process itself and an output.

The inputs of the transformation process can be classified in:

- Transformed resources: Represent the resources that are going to be modified in some way. Transformed resources in an Automobile factory are raw materials. In a bank, they are information and customers;
- Transforming resources: All resources that act on the transformed resources. The two main inputs are facilities (equipments and buildings) and staff (actors that operate, maintain, plan and manage the operation.

Slack et al. (1999) classifies the transformation process in:

- Material processing: Changes the physical properties of the material (shape, characteristic composition), its location (transport, orders) or its possession (retailing stores);
- Information processing: Can change information properties (financial services), store information (meteorology records and libraries) or change its location (telecommunications);
- Customer processing: Can be physically converted (hairdressing and surgeries), psychologically converted (theaters and cinemas) or accommodated (hotels).

And the outputs can be classified in:

- Goods: Are tangible, storable and transportable. Quality from the customer viewpoint is basically product related;
- Services: Are in tangible and cannot be stored or transported. They are typically produced simultaneously with their consumption. Quality depends not only on the outcome of the service, but also on the customer's perception of the delivery system.

The most important challenge of a transformation process system is to assure that the production rate meet the market demands. And that is the reason for the development of Production Planning and Control (PPC) systems. Therefore, the PPC systems work as a regulating mechanism. As shown in Figure 3, this regulating system must regulate the production rate by measuring its performance and comparing these measures with the objectives while deviations may activate corrective decisions.

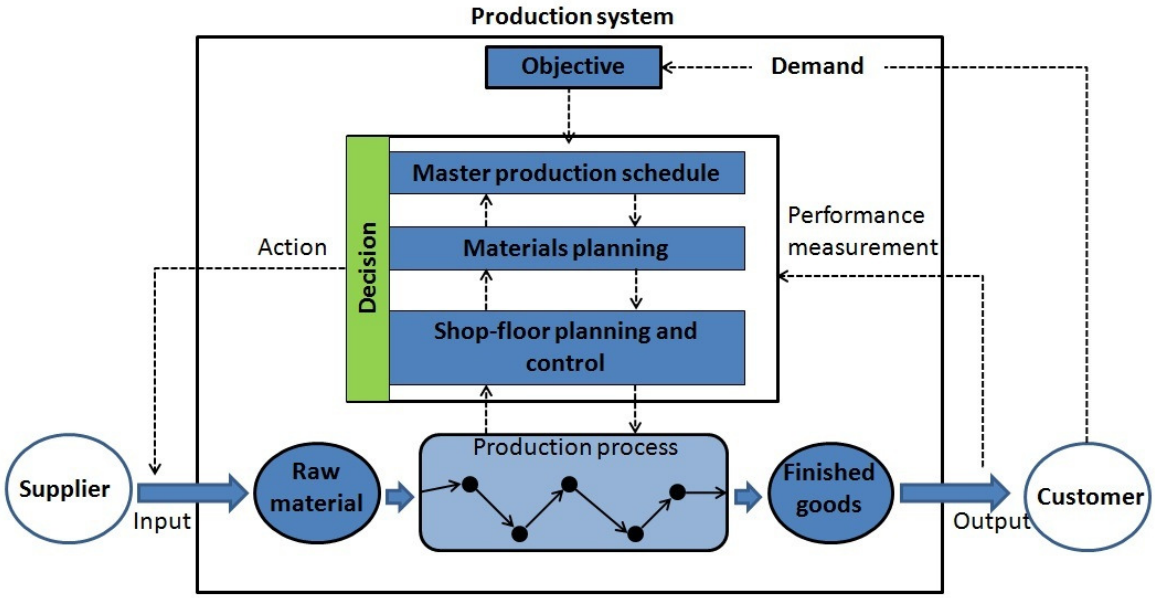

Figure 3 - Generic structure of a PPC system
Source: Sousa (2004)

According to Vollman et al. (1997) a PPC system provides information to efficiently manage the flow of materials, effectively utilize people and equipments, coordinate internal activities with those suppliers, and communicate with customers about market requirements. Hence, the PPC system provides the information necessary to make intelligent decisions about planning and controlling the production.

The British Standards document BS 5192 Part 1:1993 states that the PPC system occupies a central position in the exchange of information between the functional departments within a

manufacturing organization, touching sales, marketing, finances, engineering, purchasing, production, assembly and consignment departments. A common representation of PPC includes the following characteristics:

- A hierarchy of planning that involves a progressive detailing of high level plans to produce operational plans and associated instructions;
- Communication that allows the plans to reach the appropriate people at an appropriate time;
- Feedback that provides suitably summarized information about performance to the controllers of the plans.

Therefore, the PPC system plays a crucial role in the organization management. It represents a link between the strategic planning and routine management decisions and integrates different organization functions in the achievement common objectives (CORRÊA, 2001).

2.4. Configuration aspects of a PPC system

In the context of this work, "PPC system" denotes the entirety of functions and tools used for the planning and control of the logistic processes in a manufacturing company. The scope of application of a PPC system includes the three value-add process Source, Make and Deliver in accordance to the terminology of the Supply Chain Operations Reference (SCOR), Figure 4 (WIENDAHL, 2005).

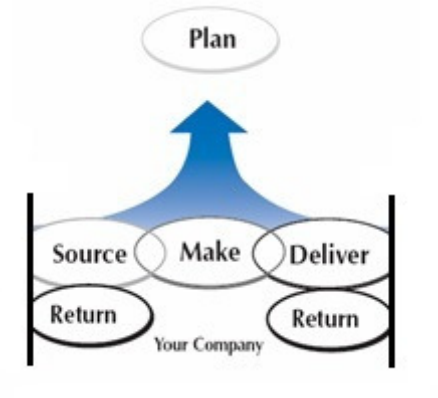

Figure 4 -Management Process in SCOR Model
Source: (SCC, 2009, p.3)

Based on this definition, Wiendahl (2005) distinguishes six configuration aspects of a PPC system (Figure 5):

- *Logistic objectives:* Are the main connection with the company's strategy and customer demands. Defines the long-term achievement of the PPC system in terms of performance and support all other PPC activities by defining common targets;
- *PPC process:* Determine the logical and chronological order of PPC planning and control activities. Define the workflow of information along the production process. It is important to notice that it doesn't encompass the material flow, although it follows the same logic;
- *PPC objects:* Represent the planning objects of PPC, such as articles (finished goods, components and raw material), resources (machinery and personnel) and orders (customer orders, spare parts orders, sample orders, etc.);
- *PPC functions:* Encompass the activities required to plan and control the logistic processes in the stores and in production. The fundamental activities are the definition of local objectives and targets, forecasting and decision-making, providing feedback on order progress and continuous improvement;
- *PPC responsibilities:* Define which members of the staff are responsible for each of PPC activities;
- *Tools for planning and control:* The five configuration aspects stated above constitute the logical core of a PPC system. The tools for planning and control support all PPC activities by providing information and implementing (semi-) automated activities (WIENDAHL, 2005).

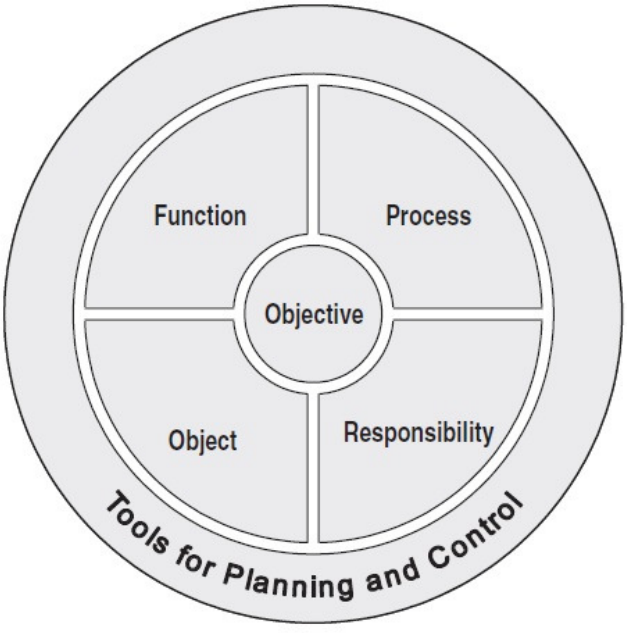

Figure 5 - Configuration aspects of a PPC system

Source: Wiendahl (2005)

The configuration aspects presented above serve as a theoretical basis to analyze the effects of culture on the PPC system. The purpose of this work is to find out how cultural aspects interact with the PPC system. As the definition of culture stated in section 2.1 show, culture is inherent to human behavior, thereby guiding this work to analyze the configuration aspects which has something to do with human interactions. Hence, the configuration aspects which will be focused in this study will be the **PPC objectives, PPC responsibility and PPC functions**. The PPC object is represented by the employee itself, rather than human interaction. The PPC process represents the flow of information in the production system, which follow the same logic of the material flow and the organization of functions. It is, therefore, a consequence of PPC responsibility and PPC functions. The tools for planning and control are also developed in accordance with the PPC functions, as they represent the atomization of operational activities. In the following sections the logistic objectives and the PPC functions will be more deeply discussed

2.4.1. Logistic objectives: PPC system in a strategic context

2.4.1.1. Impact of PPC system in the manufacturing competitive dimensions

According to Hill (1989) there are 5 manufacturing competitive dimensions: cost, quality, delivery speed, delivery reliability and flexibility. The dimension *cost* is related to the ability of the company to minimize the costs of its products and, therefore, increase its profits or gain advantages before its competitors. The dimension *quality* is the performance aspect of a production system which enables the company to delivery products without malfunctions. *Delivery speed* aims to minimize the time customers must wait to receive their products or services. *Delivery reliability* is related to the capacity to fulfill the delivery requirements such as delivery time and correct quantities of products. *Flexibility* represents the ability to react before changes, which can be related to product mix, delivery date, production volume and others.

An effective PPC system can provide substantial competitive advantage for companies through lowering costs and providing greater responsiveness to the market. It is within the design and execution of PPC activities that most impact on the strategic objectives of quality, cost, delivery and flexibility can be made (VOLLMANN et al., 1992).

CORRÊA (1997) identifies how the PPC decisions can impact the performance of each of the five manufacturing competitive dimensions:

- **Cost**: The PPC system is responsible for keeping the right quantity of inventory in the correct place. Storage and shortage costs must be minimized. The PPC system defines the material purchase planning, minimizing costs related to obsolescence, remains and interruptions of the production system due to shortage of materials. The production planning also defines how resources such as labor and equipment are to be utilized (implying certain levels of excess capacity, overtime, hiring and firing and subcontracts). Moreover, fines due to delivery can be avoided through an efficient due date management, which is a PPC system duty;
- **Quality**: Perhaps, the aspect less affected by the PPC system. Nevertheless, there are some indirect impacts. First of all, the PPC system has to keep updated documents such as product compositions, minimizing products composition failures. Secondly, excessive inventory level can hide failures in the production system, among them, quality failures. Finally, the PPC system is also responsible for the maintenance of systems which support traceability of malfunctioning products;
- **Delivery speed**: This dimension is affected by the throughput time, which is affected by the inventory level in queue. Besides, the PPC system has to minimize the effects of unexpected events, such as breakage of some equipment;
- **Delivery reliability**: As mentioned above, the PPC system has to prevent overutilization of resources and minimize the effects of unexpected events. Moreover, it is necessary support the sales department with information that enables this department to minimize the effects of possible delays. Slack (1993) suggests three actions affected by production planning and control process to increase production systems reliability: planning the future, controlling resource utilization and close monitoring of operations progress.
- **Flexibility**: It is related to the capacity of the PPC system to react before changes. Evidently, it is not only the PPC system that defines the flexibility level. It depends, likewise, on the structural resources, such as equipments and human resources. Nonetheless, even if the organization has flexible resources, it is necessary to have efficient information systems to support and guide the changes;

2.4.1.2. PPC system and corporate strategy

Corporate strategy is the overall plan which defines how a company will create competitive advantage in the businesses in which it competes, developed based on the

analysis of corporate strengths and weaknesses and customer demands (HOFER, 1978). The manufacturing strategy is a long-range game plan for the production of the corporation's products or services that provides a road map for what the production function must do if business strategies are to be achieved, defining both the capabilities that the manufacturing unit must have to compete, and the structural and infrastructural choices that support those capabilities (GAITHER, 1992; MILLER, 1994). The manufacturing strategy is derived directly from the corporate strategy. Therefore, in order to achieve superior performance, the manufacturing strategy must be congruent with the corporate strategy.

The manufacturing competitive dimensions play a crucial role in the definition of the manufacturing strategy. It is essential that the set of plans, programs and activities of the production system are aligned with the manufacturing competitive dimensions established for the organization.

During the development of the manufacturing strategy targets to guide the PPC system must be defined. Through the definition of targets the PPC system is able to link its specifics aspects of performance to business strategy and customer demands.

Besides quality standards and price of products, logistic factors such as delivery time and delivery reliability are crucial for companies to distinguish themselves within the market. Production, as the primary function to fulfill orders, is increasingly called upon to improve effectiveness. Hence, as shown in Figure 6, the PPC system plays a strategic role in the achievement of market success.

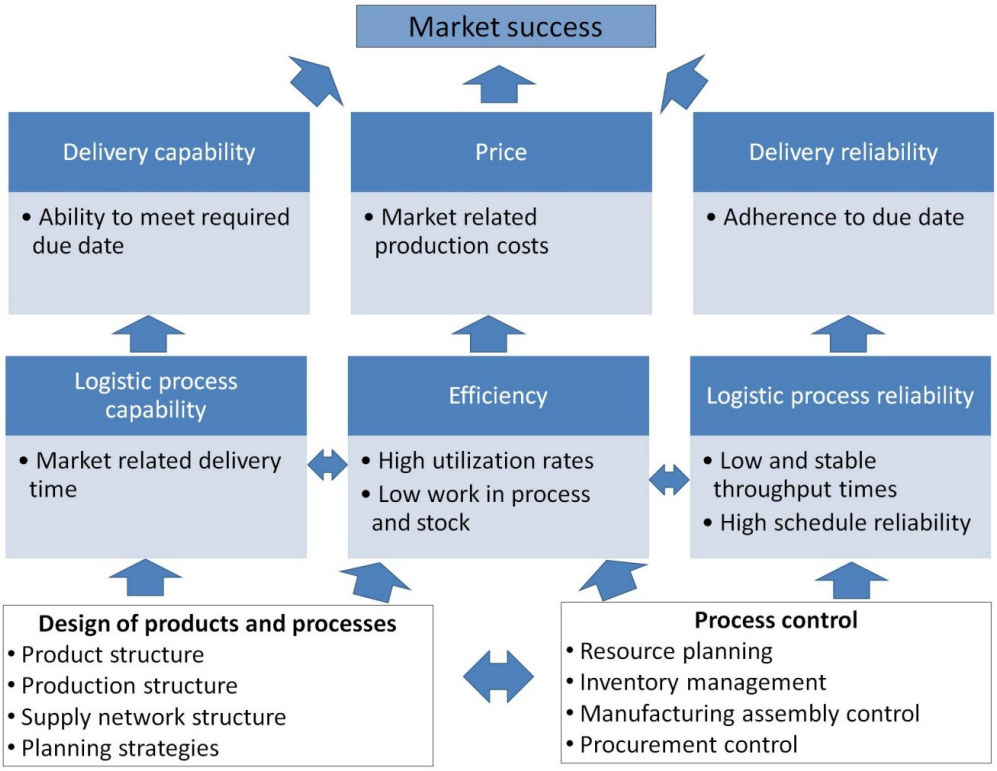

Figure 6 - Logistic key performance indicators for production firms
Source: Nyhuis (2009a, p.3)

2.4.1.3. Logistic objectives of a PPC system

In order to define targets that meet the organization strategy, it is of great importance to know the logistic objectives of PPC and the relations between them.

The efficiency of a PPC system can be measured by 4 logistic target variables: schedule adherence, throughput time, output rate, inventory and costs. These logistics objectives support the internal logistic system of a company in the form of high schedule reliability, short throughput time, high utilization, low WIP level and low costs of storage, transportation and production (NYHUIS, 2009b).

The problem of the logistics targets lie on the existence of conflicts between each one of these objectives. Nyhuis (2009a) calls this conflict as the "dilemma of operations planning". This conflict can be visualized in the Figure 7. The curve shows the characteristic shapes of the performance measures utilization (output rate), throughput time, schedule reliability and logistic costs for variations of the independent variable WIP level.

The curve shows that as the WIP level grows the throughput time increases and the schedule reliability deteriorate. Moreover, the throughput time cannot fall below a minimum due to capacity aspects, such as technology. Low WIP level supports short throughput time

and, therefore, high date reliability. Nevertheless, low WIP does not support high utilization and high utilization rate decreases date reliability.

It can also be noticed from the curve that the minimum cost and maximum schedule reliability points do not coincide. Hence, the definition of a WIP level in order to achieve specific output rate or throughput time does not maximize the logistic performance in terms of schedule reliability and logistic costs.

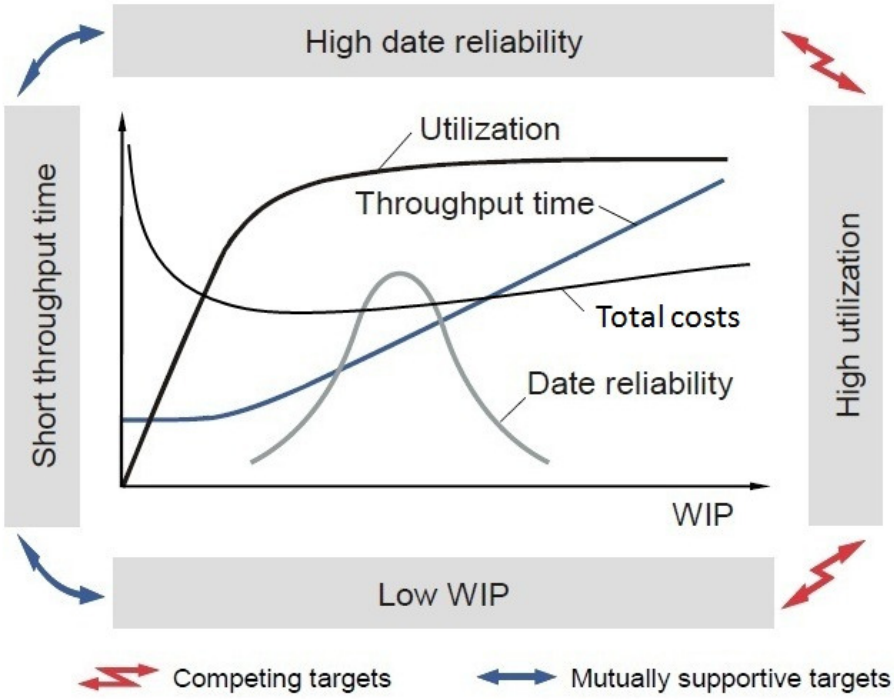

Figure 7 - Logistic operating curves
Source: adapted from (Nyhuis, 2009c).

The existence of the conflict between the logistic objectives demonstrates the importance of defining strategic goals for the PPC system. It is important to know which characteristic should have more importance and acknowledge the consequences expected with regards to the other characteristics. Therefore, in order to meet its logistic performance, a company must analyze the four logistic objectives in terms of a trade-off, which enable the organization to achieve its strategic objectives.

The vicious circle of PPC depicted in Figure 8 shows how lacking knowledge on the trade-offs between the logistic objectives can lead to wrong decision-making and consequently to difficulties in meeting the organization logistic objectives. The circle begins when production planners wrongly ascribe the poor schedule reliability to the short throughput time. As a consequence, the orders start being released earlier in time, which

increases the WIP level. This implies long queuing times in production, which leads to further deterioration of the schedule reliability.

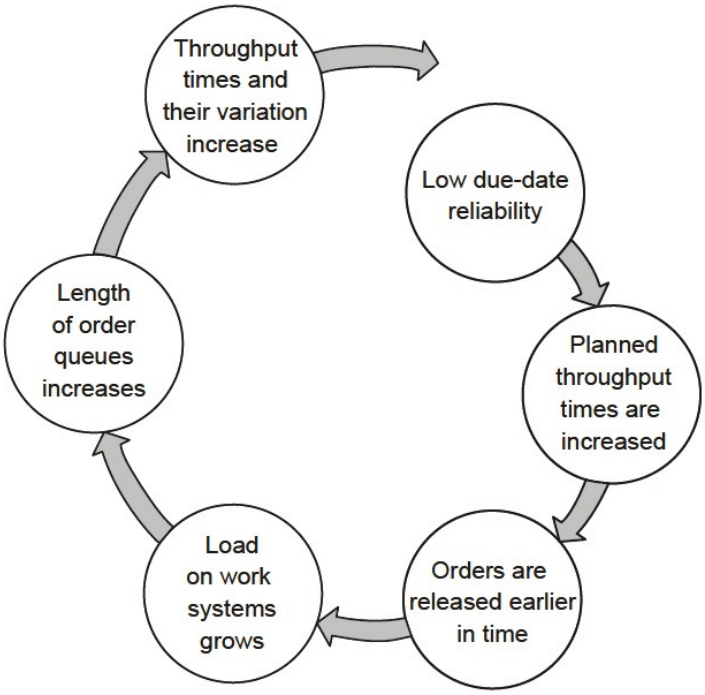

Figure 8 - Vicious circle of errors of PPC
Source: Nyhuis (2009b)

2.4.2. PPC functions

An adaptation of the PPC model proposed by Hackstein will be used to describe the main functions of a PPC system (Figure 9).

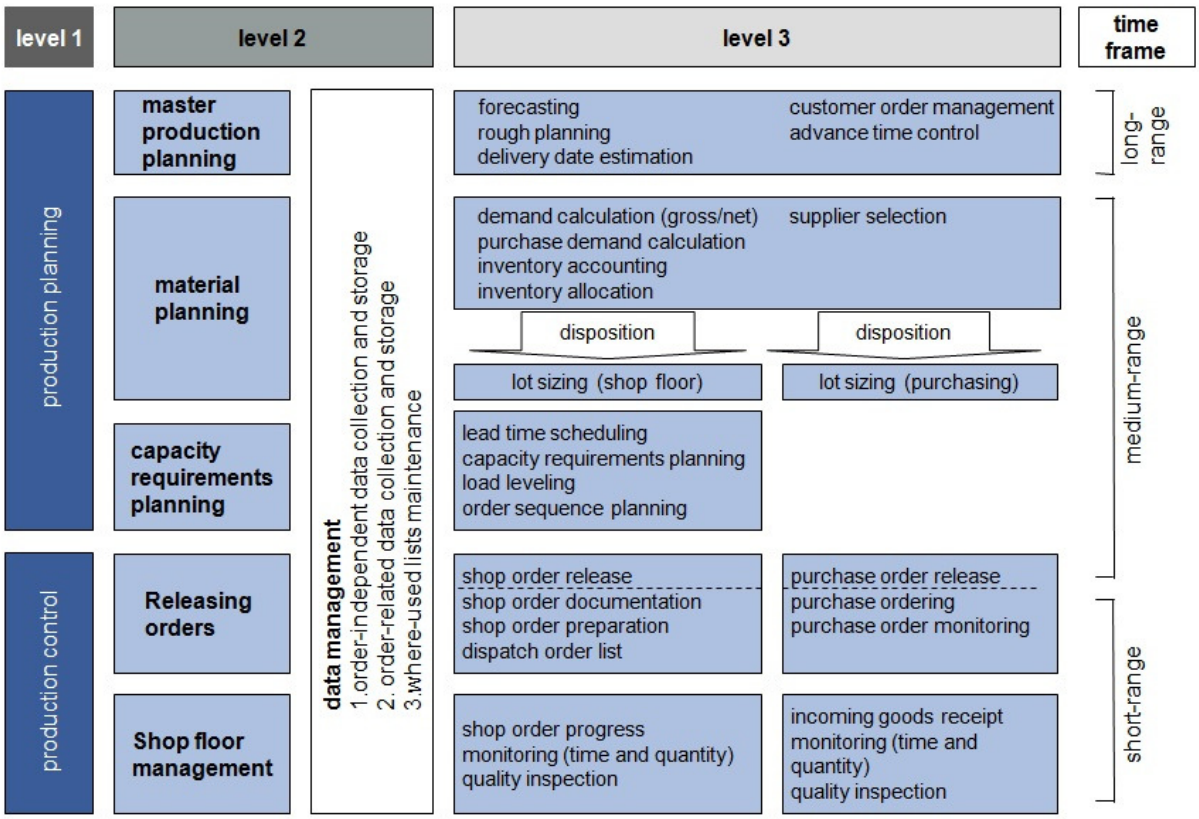

Figure 9 - PPC system main functions

The *Master production planning* meets the customer demand with the organization's internal resources by defining the production rate of finished goods in the long term level. This function improves the order-delivery-date promising process by improving the management of finished goods and management of capacity (CORRÊA, 2001). It represents what the company plans to produce expressed in specific configurations, quantities and dates. The master production planning must take into account the forecast, the production plan and other important considerations such as backlog, availability of material, availability of capacity, management policy and goals. It also does the interface between the marketplace and the other production planning and control activities (VOLLMAN et al., 1997). The specification of customer demand is the first step to be met by the production plan. In most contexts, future demand is at best only partially known, and often is not known at all. Therefore, it relies on a forecast for the future demand. To the extent that any forecast is inevitably inaccurate, one must decide how to account for or react to this demand uncertainty (GRAVES, 1999). It is also important to notice that the decisions established in this function are an essential input variable in other PPC functions such as materials planning and capacity planning (CORRÊA, 2001).

The *Materials planning* generates and keeps updated sales, production, facilities, labor, equipments, materials, financial, capacity, purchasing and new products development plans. One of its main purposes is to establish production rates that will achieve management's objective of maintaining, raising, or lowering inventories or backlogs, while usually attempting to keep the work force relatively stable (CORRÊA, 2001). Besides, this function aims to efficiently and effectively manage the material flow in order to keep the value-adding activity in manufacturing going on without interruptions

The *Capacity planning* aims to synchronize the production requirements with available resource capability by calculating the workload of each work center in the future and, therefore, providing information that support the decision-making process related to overtime hours, buying equipments, hiring, firing, subcontracting and managing bottlenecks and others. On one hand, insufficient capacity increases inventory and leads to a deterioration of customer service level (schedule reliability). On the other hand, excess of capacity leads to idle capacity, which means unwanted costs (CORRÊA, 2001). Vollman et al. (1997) propose four techniques to plan capacity: Techniques such as *Capacity Planning using Overall Planning*, *Bill Capacity*, *Resource Profiles* and *Capacity Requirements Planning.* The last one is implemented together with MRP systems and has been broadly implemented (VOLLMAN et al., 1997).

The *Releasing orders* sets the point in time at which orders are released to the shop floor. This function must set both the planned and the actual values (time of generating and releasing orders) in order to make possible comparisons, which provide the necessary information to support decision-making. This function aims to regulate the WIP level by aligning the load with the production's actual WIP situation, influencing both the throughput time and the utilization level (NYHUIS, 2009b). According to Scarpelli (2004) there are three kinds of orders: purchase, manufacturing and assembly. The architecture of this function can be either centralized (one entity is responsible for generating, releasing and follow the order) or decentralized (programming and controlling activities are autonomously decided and monitored by the operator, based on pre-defined operational parameters). Finally, there are five main manufacturing strategies which support this function: MTS (make-to-stock), ATO (assembly-to-order), MTO (make-to-order), BTO (but-to-order) and ETO (engineering-to-order) (NAZARENO, 2008).

Shop floor management is related to the activities that support the PPC systems in a very short-term, such as work instructions, lot size management, allocation and coordination of collaborators and equipments. This function must also verify the actual PPC system

performance and regulate it in order to achieve the logistic performance objective and provide solutions to unpredicted problems that may occur (Corrêa, 2001).

3. Methods

This study is a theoretical approach, since it aims to develop a nonexistent theoretical construct on the Production Planning and Control literature based on published materials such as books, articles.

The first step of this study consisted in reviewing the cross-cultural management literature to provide an overview of what had already been done on the impact of culture on management. This phase aimed to show which fields had already been covered by the literature and which fields were missing yet. The review was done through several books and papers from the most important and renowned journals.

Afterwards, an overview of the main cultural dimensions models was done. In this phase, different cultural dimensions were exploited to, posteriorly, be used to study the impact of culture on Production Planning and Control systems.

Subsequently, a review of the PPC literature was done in order to find the global transfers of PPC systems, a common structure in which the impacts of the differences in culture can be examined.

Finally, a relation between the cultural dimensions and the PPC systems will be done. In this phase, the impacts of culture on PPC systems will be exploited. The study of the impacts of culture on the PPC systems will be based on comparisons between the characteristics of the cultural dimension and the PPC system and on the results of other studies (mainly found International Journals' databases), which although are not directly related to PPC have lots of results which can be translated to this study. Three kinds of relations will be exploited, negative (<0), neutral (=0) and positive (>0). A negative relation shows that the higher the index for the cultural dimension, the lower the intensity presented by the organization for the PPC characteristic. A positive relation shows that the higher the index for the cultural dimension, the higher the intensity presented by the organization for the PPC characteristic. And a neutral relation shows that there is no relation between the cultural dimension and the PPC characteristic.

4. Results and Discussions

4.1. Definition of the cultural dimensions which will support the study

The objective of this section is to compare the two cultural dimensions models outlined in section 2.2 and come up with an unified model on which this study will be based.

First of all, it is noticeable that the Trompenaars' communitarianism/individualism dimension is very similar to collectivism/individualism Hofstede's dimension. Both dimensions state the orientation of individuals either in working as a member of a group or on their own. Collectivism/individualism Hofstede's dimension can also be linked to Trompenaar's specific/diffuse relationships dimension, as Hofstede's work showed that in collectivistic cultures, the personal relationship prevails over the task, while for people in individualist cultures the opposite occur (Hofstede, 2001).

Trompenaar's dimension universalism/particularism states the concern with rules and procedures, which is related to Hofstede's dimension uncertainty avoidance.

Moreover, Trompenaar's dimension achievement/ascription, which is related to how individuals acquire status, can be related to Hofstede's dimension power distance, taking in consideration that ascription oriented cultures reflect a disposition to accept power distance. Nevertheless, power distance dimension is more comprehensive, for the reason that it not only describes how power is acquired but also how individuals of a society accept and expect that power is distributed unequally.

Trompenaars' neutral/emotional dimension is related to the way feelings are openly expressed, which describes behavioral aspect rather than a cultural value.

It is worthy of attention that although both authors have proposed a dimension for describing perception of time, they have approached different perspectives. While Trompenaars has focused on the extent to which it is preferable to do only one thing at a time (Sequential or monochromic perception of time) or whether it is preferable to do several different things simultaneously (synchronous or polychromic perception of time), Hofstede has focused on the extent to which the individuals of a culture think either on a long range basis or a short range basis. Neverthelees, as the study conducted by Voss (1998) suggests, synchronic oriented cultures show a long term perception of time while sequential oriented cultures show short term perception of time. Therefore, Trompenaars' cultural dimension Sequential/synchronous perception of time is more comprehensive in the way that can be used to analyze both if there is a focus on the long or short term and if there is a Monochronic or polychromic view of time.

The other to remaining Trompenaars' and Hofstede's dimensions, respectively Inner/outer-directed locus of control and Masculinity/femininity, don't seem to have any relation to any of the other cultural dimension. As no work was found in the literature studying the impacts of Trompenaars' dimension Inner/outer-directed locus of control, this dimension will not be considered in this study. Hence, the cultural dimensions which will constitute the theoretical basis to analyze the effects of culture on the PPC system are: Power distance, Uncertainty avoidance, Individualism/collectivism, Masculinity/femininity and Sequential/synchronous time. The relation of each of those cultural dimensions with the PPC systems characteristics will be presented as RP, RU, RI, RM, RS, respectively.

4.2. Cultural impacts on PPC objectives

This section will show the impact of culture on the definition of PPC objectives. The findings are related to the degree of linkage between the PPC objectives and the corporate strategy, differences in focusing the logistic objectives, data on which the strategy is based and tendency to present customer and market focus. Table 7 summarizes the findings. The table show if there is a positive, a negative or a null relationship between the PPC aspect analyzed and the cultural dimension.

Companies in high power distance countries usually present tall organization pyramids, which are barriers to the distribution of information down the organization hierarchy, and information constrained by hierarchy, which emphasize the lack of access to information from nonsuperiors. The linkage between the corporate strategy and the PPC objectives are directly related to the access and distribution of information. In order to effective link the corporate strategy and the PPC objectives, the decisions established on the corporate strategy must reach all the employees. Therefore, the linkage between the corporate strategy and the PPC objectives will face more troubles in high power distance cultures than in low power distance cultures ($RP1<0$). The same is expected for the individualism dimension. In low individualism cultures incentives tend to be given to in-groups and personal relationships prevail over task and company. These characteristics facilitate the share of information and thus make it possible to link more efficiently the PPC objectives and the corporate strategy. High individualism is related to a more competitive environment, which leads to less sharing of information and, therefore, to an environment where the linkage between PPC objectives and the corporate strategy are less efficient ($RI1<0$).

The next question is whether the cultural dimensions have any influence on which logistic objectives are focused by an organization. The relation between the logistic objectives and the

cultural dimensions can be analyzed in terms of how organizations perceive the utilization of the logistic objectives in the achievement of market success (see Figure 6). It is possible to comprise this relation in two categories, one for seeking efficiency (focusing on high utilization and low work-in-process and stock) and another one for seeking logistic process reliability (focusing on low and stable throughput time and high schedule reliability).

The lack of acceptation of employees in low power distance cultures of centralized power, which leads to a less proportion of supervisory personnel, facilitated access to information and consultative way of managing, result in an environment where people may not be measured by how much they work, where temporary idle times may be accepted in order to achieve a "bigger" objective. Low power distance cultures would, therefore, present a great concern over the logistic process reliability, focusing on low and stable throughput time and high schedule reliability (RP3<0). In fact, a relation between data from the Global Manufacturing Practices (Whybark and Vastag, 1993, p. 37) over the importance of operations schedule and Hofstede's dimension power distance (Figure 10) show that the bigger the power distance index, the smaller the importance of operations schedule. The opposite is expected for high power distance cultures, where the larger proportion of supervisory personnel leads to an environment where idle time is seen as waste and therefore the logistic objective utilization and work-in-process level may be focused (RP2>0).

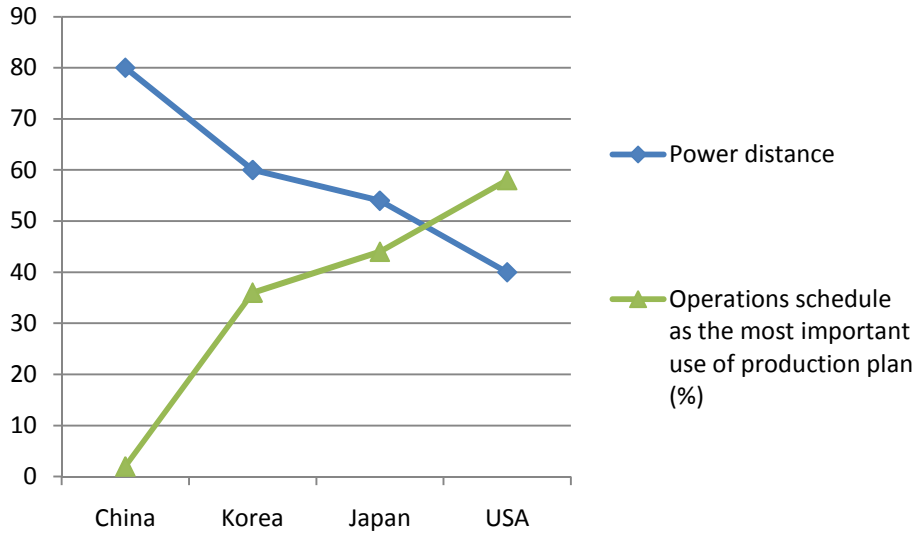

Figure 10 – Relationship between Power distance and the percentage of companies which consider operations Schedule the most important use of production plan

Aquilon (1997) noticed that German suppliers connected quality and flexibility with production concerns. He concluded, further, that masculine countries have a production orientation and that they are more prone to apply mass production. He also argues that this

disposition is increased when combined with high uncertainty avoidance, which is well expected since the mass production is related to principles of standardization and simplification. In high uncertainty avoidance cultures there is a tendency in focusing on standardization (of skills for low power distance and of work process for high power distance) as a mechanism of coordinating activities (see Figure 1). As well known, in mass production there is a special concern about efficiency. Therefore, it is expected that cultures with either high uncertainty avoidance or high masculinity present special concerns with the logistic objective utilization and work-in-process level (RU2>0, RM2>0).

Vecchi (2009) argue that low masculine countries tend the use information more extensively to support decision making and Yoo et al. (2005) conclude that masculine countries focus more on internal operations and feminine countries display more a customer focus (RM6<0, RM7>0). The greater display of customer focus together with the resolution of conflicts through problem solving, compromise, and negotiation in feminine cultures will probably result in a concern with the logistic objectives throughput time and schedule reliability (RM3<0).

High uncertainty avoidance is related to formalization, precise answers and factual information as the basis of managerial decisions, which lead to a higher use of quantitative and factual information (RU4>0). Low uncertainty avoidance cultures, on the other hand, usually rely less on factual information as the basis of managerial decisions, which leads to a higher usage of intuition and subjective information for developing the strategic plan (RU5<0). It is expected also that high power distance is positively related to the usage of quantitative and factual information to develop the strategy, since high power distance cultures usually present a less participative management style, which stimulate to obtain information from sources other than workers (RP4>0) (WACKER, 1998).

The study carried out by Voss (1998) showed through a comparison between Japan and the USA that the synchronic perception of time lead the Japanese to more efficiently translate corporate and marketing goals into a manufacturing strategy (RS1>0). Besides, with a synchronic perception of time, it is expected for the culture not to present special concerns with any of the logistic objectives, thereby focusing on all of them (RS2>0, RS3>0).

	Power distance	Uncertainty avoidance	Individualism	Masculinity	Synchronous time
Linkage between the corporate strategy and the PPC objectives	RP1<0	RU1=0	RI1<0	RM1=0	RS1>0

Concern with the logistic objective utilization and work-in-process level	RP2>0	RU2>0	RI2=0	RM2>0	RS2>0
Concern with logistic objectives throughput time and schedule reliability	RP3<0	RU3=0	RI3=0	RM3<0	RS3>0
Usage of quantitative and factual information to develop the strategy	RP4>0	RU4>0	RI4=0	RM4=0	RS4=0
Use of intuition and subjective information to develop the strategy	RP5=0	RU5<0	RI5=0	RM5=0	RS5=0
Customer focus when developing the strategy	RP6=0	RU6=0	RI7=0	RM6<0	RS6=0
Focus on internal operations when developing the strategy	RP7=0	RU7=0	RI7=0	RM7>0	RS7=0

Table 7 - Summary of the influences of culture on PPC objectives

4.3. Cultural impacts on PPC responsibility

The impacts of culture on this configuration aspect will be analyzed in terms of teamwork, employee empowerment and distribution of responsibility between functions and the hierarchy. These three aspects of the PPC responsibility are very important since they are related to the ability of the personnel involved in the PPC activities to make decisions. Table 8 summarizes the findings.

Teamwork has been currently indicated as an important initiative to improve performance. In JIT, for instance, teams are used to fight waste, reduce set-up times, and help to remove inventory from the system. Moreover, teams of empowered employees have been considered a key element of being a world-class manufacturer. With teamwork, companies expect to ensure that employees are sharing their diverse knowledge, skills, and experiences with each other, thereby spreading learning across the entire company.

It is well expected that the cultural dimension individualism/collectivism plays an important role in the definition of teamwork. Nevertheless, it is important to notice that this cultural dimension doesn't imply that teamwork should be applied in collectivistic cultures while in individualistic cultures teamwork would not be efficient. Teamwork can be efficient both in individualistic and collectivist cultures when they are properly managed. In collectivistic societies there is more belief in collective decision and personal relationships prevail over task, which means that in these cultures management is management of groups. In other words, the group should be evaluated as a group, incentives should be given to in-groups and other activities such as training will be more effective at group level (RI4<0). In individualistic cultures, on the other hand, management is management of individuals. In this

case, instead of being seeing in a social context, the employee has to be seen as individuals. Incentives, composition of work groups and other practices most be based on individual criteria (RI3>0). Besides, Yoo et al. (2006) argues, with empirical support, that the social support of the collectivistic cultures should increase perceptions of empowerment, since members assist to meet organizational goals (RI1<0).

As already stated before, employee empowerment implies sharing of authority in the decision making process. It involves the ability of the operators to make autonomy decisions and to take responsibility for PPC results, which is related to quickly acting before the occurrence of unplanned disturbances. Hofstede's work has shown that power distance is the cultural dimension which has greater impact on employee empowerment. Low power distance cultures are characterized by decentralized decision structures and less concentration of authority, initiatives from blue collar workers and subordinates are common and expected (HOFSTEDE, 2001; AQUILON, 1997). Hence, the development of empowered employees is facilitated in low power distance cultures. In high power distance cultures, on the other hand, the development of empowered employees must be "pushed" from the high hierarchy (RP1<0). Earley (1999) conducted a study over the influence of power distance on team performance and showed that in high power distance cultures, group efficacy and performance will be most directly related to the views expressed by high status group members while in low power distance cultures group efficacy and performance will be reflected equally by all group members' opinions. It is expected, therefore, that the performance of team in high power distance cultures will always be lower than in low power distance cultures (RP3<0, RP4<0).

Many problems in PPC systems happen due to inconsistent attribution of responsibility for functions. Wiendahl (2005) exemplifies this problem. The three departments Production, Dispatch and Logistic have their own system of objectives and, consequently, different priorities. Dispatch is responsible for order release and its main objective is "short throughput time". Production responsibility is capacity control and sequencing of work and its main objective is to keep "high utilization". Logistic responsibility is the delivery date and its main objective is "high schedule reliability". Wiendahl (2005) argues that the stumbling block dues to the different departmental objectives. For instance, if the customer demands grow over the capacity, the dispatch department tends to release order previews in time. Also, when the demand is low, production wants orders to be released previously to maintain high utilization while dispatch needs to keep short throughput time. He concludes, then, that in order to overcome this stumbling block the decision could be centralized in a management center. It is

expected, therefore, that this problem would be minimized in high power distance and high uncertainty avoidance cultures. In high power distance cultures the greater concentration of authority leads to centralized decision structures, which means emphasis on central planning and hierarchical control (RP5>0) (SWAN, 2007; BRIAN, 2007). This characteristic may also influence how involved top managers are in the preparation of the production plan (RP2>0). Indeed, the relation between data over the involvement of CEO on the preparation of the production plan, available on the Global Manufacturing Practices research (WHYBARK, 1993), and Hofstede's indices of power distance shown in Figure 11 indicate that a relation may exist.

In high uncertainty avoidance cultures, the need for well-defined rules would be an advantage in determining unambiguous responsibility for each of the functions (RU6>0). Hofstede (2001) also concluded that in high power distance cultures top managers tend to be more involved in operational tasks (RU2>0).

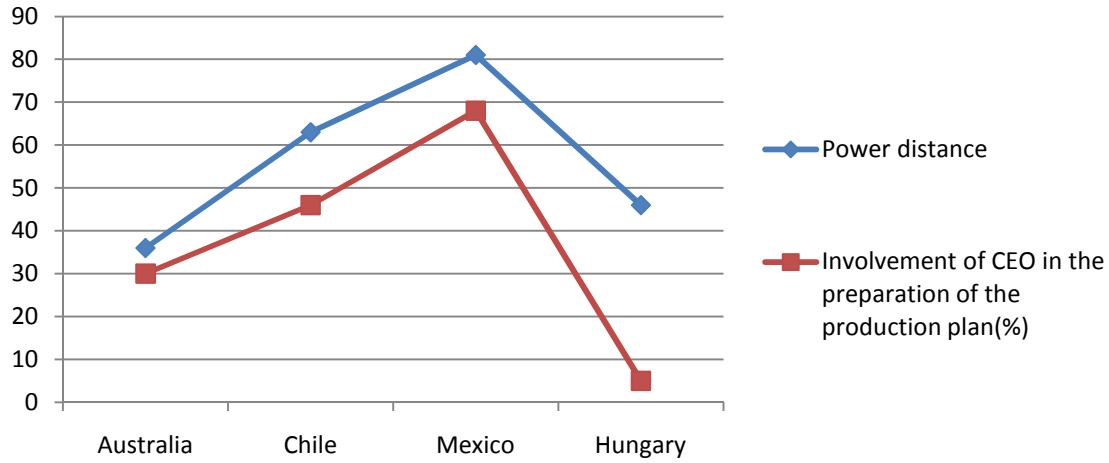

Figure 11 – Relation between Power distance and the involvement of CEO on the preparation of the production plan

In feminine cultures workers give great importance to relation and work conditions and managers are considered employees like others (HOFSTEDE, 2001). This environment may encourage employee empowerment (RM1<0). Another characteristic of feminine cultures is the humanization of work through creation of groups, which will probably lead to a high performance of teams when team members are evaluated by the achievement of the group (RM4<0). In masculine cultures, on the other hand, the more assertive, aggressive and competitive may lead to a higher performance of teams when team members are evaluated individually (RM3>0).

Hofstede's work has shown the synchronous oriented cultures individuals tend to valorize relationship and that a sense of common shame tend to prevail. As the study conducted by Earley (1999) shows, Chinese (a typical synchronic oriented culture) tend to perform better as a group when they are evaluated also as a group, the performance decreases when the members of the team are evaluated individually (RS3<0, RS4>0).

	Power distance	Uncertainty avoidance	Individualism	Masculinity	Synchronous time
Employee empowerment	RP1<0	RU1=0	RI1<0	RM1<0	RS1=0
Top management involvement in the preparation of the production plan	RP2>0	RU2>0	RI2=0	RM2=0	RS2=0
Performance of teams when team members are evaluated individually	RP3<0	RU3=0	RI3>0	RM3>0	RS3<0
Performance of teams when team members are evaluated by the achievements of the group	RP4<0	RU4=0	RI4<0	RM4<0	RS4>0
Emphasis on central planning and hierarchical control	RP5>0	RU5=0	RI5=0	RM7=0	RS5=0
Unambiguous definition of tasks	RP6=0	RU6>0	RI6=0	RM6=0	RS6=0

Table 8 - Summary of the influences of culture on PPC responsibility

4.4. Cultural impacts on PPC functions

The analysis of cultural impacts on this configuration aspect will be done based on the model shown in section 2.5.2. Cultural impacts on each of the functions and differences in strategic time orientation will be analyzed. Table 9 summarizes the findings.

As already stated before, high power distance cultures usually present a less participative management style, which stimulate managers to obtain information from sources other than workers. Therefore, this cultural dimension is expected to be related to the usage of computer for forecasting (RP2>0) and the usage of quantitative techniques for forecasting (RP4>0) (Wacker and Sprague, 1998). In low power distance cultures, on the other hand, managers rely on personal experience and on subordinates and, therefore, tend to use more qualitative techniques for forecasting (RP3<0), such as the Delphi method. As companies in low power distance cultures tend to present flat organization pyramids, it is expected that the flow of information will be facilitated, reaching faster the responsible function and with more

accurate data. Thus, the production system in low power distance cultures is expected to present higher level of responsiveness to market changes (RP6<0). Aquilon (1997) has studied different characteristics among volvo's suppliers. He found that there was always a high distance between high power distance suppliers and Volvo in terms of cooperation and understanding of common objectives (RP12>0, RP13>0). Besides, he noticed that the relation was characterized by "coldness" and a tendency of high power distance companies to "protect their employees from a dominating customer" (RP11<0, RP8>0). The centralized decision structures and more concentration of authority in high power distance may conduct the architecture of the releasing order function to be centralized (RP19>0) and the expectation of employees in these cultures to be told what to do may increase their dependency on superiors in making decisions (RP24>0). This characteristic together with the information constrained by hierarchy may decrease the accuracy of feedback data in the shop floor (RP23<0). Finally, the great concern with schedule reliability in low power distance, as stated in the topic 4.2, may induce these cultures to intensively use backlog information to release orders (RP21<0). In high power distance, on the other hand, the great concern with utilization together with tall organization pyramid may increase the usage of capacity and forecast information to release orders (RP20>0, RP22>0).

Individualism plays an important role in how the relationship with the supplier is carried out. In collectivistic cultures, the belief in collective decisions and the greater importance attributed to personal relationships leads to an environment where the transaction of information and cooperation between the parts will be intensified (RI12<0, RI13<0) and the customer tend to be more listened (RI5<0). The importance of personal relationship is very emphasized in collectivistic countries, the Global manufacturing Practices data (WHYBARK, 1993, p. 238) show that in typical collectivistic countries such as Japan, Korea and China the purchase order is mostly transmitted orally or written while in typical individualistic countries such as the USA and some European countries the others are mostly transmitted by computer (RI11<0). The importance of interpersonal relationship may also influence company to use undertime rather than layoff as a mean of decreasing capacity (RI14<0, RI15>0). Wacker (1998) has shown that the more competitive environment in individualistic cultures lead to a intensive usage of quantitative techniques for forecasting (RI4>0) while the importance of personal relationships and the more open share of information lead to an intensive usage of qualitative techniques for forecasting (RI3<0).

High uncertainty avoidance is related to a strong loyalty to employer and a long average duration of employment. In these cultures there is a tendency of providing stability of

employment and long-term career prospects. Therefore, layoff will be rarely an option as a mean of decreasing capacity in high uncertainty avoidance (RU14<0). Moreover, it is expected for high uncertainty avoidance to carry out as long as possible an undertime policy as a mean of decreasing capacity (RU15>0). High uncertainty avoidance cultures lack tolerance for uncertainty and ambiguity, what leads to the development of precise instructions, detailed job descriptions and formalization of process. Thus, a systematic process and job description may be facilitated in these cultures, as both the employee and the employer feel the necessity for standardized work instructions (RU25>0), which will probably enhance the accuracy of feedback data (RU23>0). Seeking security and reduction of risk high uncertainty avoidance cultures will exhibit a greater importance of contracts for assuring supply and build up inventory as a mean of increasing capacity (RU9>0, RU17>0). Moreover, considering a greater resistance to change and the importance of loyalty to the company, high uncertainty avoidance cultures will be more prone to stay with the same supplier. Indeed, Data from the Global Manufacturing Practices (Wacker and Sprague, 1998, p.242) show that high uncertainty avoidance countries such as Japan and Korea usually present very low rate of vendors per purchased part while low uncertainty avoidance countries such as the USA and China present a high rate of vendors per purchased part (RU10<0, RU8<0).

Vecchi (2009) has shown that feminine countries tend the use information more extensively to support decision making and Yoo et al. (2005) argues that feminine countries display more a customer focus than masculine countries. Therefore low masculinity will be related to greater responsiveness of the production system to market changes and to bigger customer power to affect the determination of delivery date (RM5<0, RM6<0). In fact, the Global Manufacturing Practices data (WHYBARK, 1993, p.239) show that while in Korea, a feminine country, delivery date is mostly determined by customer, in China, USA and Japan, masculine countries, delivery date is mostly determined by either the company or negotiation. Wacker (1998) found that the type of information used to support decision-making in masculine cultures is dependent on its expected effectiveness in gaining advantage over competitors. The great concern with work-in-process in masculine countries shows also a concern with inventory management. It is expected, therefore, for the number of inventory turns to be bigger, as an attempt to use the inventory management to gain advantage over competitors (RM7>0). Managers in masculine cultures tend to be decisive, firm, assertive, aggressive and competitive. Thus, subcontracting would be hardly disapproved (RM19<0). The focus on utilization would encourage the usage of capacity information for releasing order in masculine cultures (RM20>0). The market focus in feminine cultures, on the other

hand, would encourage the usage of backlog information for releasing orders (RM21<0). Finally, the need of information for making decisions in masculine countries (Vecchi and Brennan, 2009) may lead to better Accuracy of feedback data (RM23>0).

As can be seen in Figure 9, time orientation is intrinsic to the PPC functions, with functions spread over the long, medium and short range. Moreover, time is related to new product development and introduction, sales and distribution and to two of the logistic objectives (high schedule reliability and short throughput time). Therefore, it is predictable that the cultural dimension sequential/synchronous time play an important role on how different cultures perform each of the PPC functions.

A long term orientation has been often stated as one of the reasons for the success of the Japanese practices. A short term orientation of time, on the other hand, has been lots of times stated as harmful to any corporation. But in what extend is it true? From the success of the Japanese practices could be inferred that a long term orientation is actually a predictor of successful strategy definition, as short term orientation is always related to the idea of sacrificing the "real" objectives in detriment of quick results. Nevertheless, the more analytic and probabilistic way of thinking in a short term orientation is essential to use existing assets more efficiently on existing production system and to quickly respond to unexpected events that may occur (HOFSTEDE, 2001; VOSS, 1998). Besides, a PPC system needs to take in consideration both the long term and short term in its planning activities. For instance, long term planning involves equipment planning, facility planning, sales planning and budgeting for new product development. Short term planning are used for production scheduling, purchase and order release, materials planning, budget preparation, sales planning and so on.

So what could explain the success of the Japanese practices? Hayes and Wheelwright (1984) argue that both the short term and the long term are required for a business to success. Voss and Blackmon (1998) show based on the analysis of data gathered from 600 companies over 20 countries that Japanese companies have both a stronger long-term orientation and short term orientation compared to Western companies. Therefore, the success of Japanese practices could be explained by the capability of Japanese companies in focusing both the long and short term. The Japanese are considered to be a synchronous oriented culture and, therefore, tend to engage in more than one activity at a time, with a polychromic perception of time. Synchronic oriented cultures are more prone to link the short and the long term and manage both simultaneously to achieve short term excellence. Thus, it is expected that synchronic oriented cultures present a more distributed use of the PPC functions. It means that while synchronic oriented cultures will exhibit more distributed usage of practices that

belong to all functions, sequential oriented cultures will focus on practices that belong to short-range functions (RS1>0). Besides, the focus on the long term from synchronic oriented cultures would contribute to the focus on decreasing the number of inventory turns The focus on the long term from synchronic oriented cultures is also a predictor of either building up inventory or subcontracting rather than using overtime and of a stable relationship with supply, based on long contracts (RS16<0, RS17>0, RS18>0, RS9>0, RS12<0).

		Power distance	Uncertainty avoidance	Individualism	Masculinity	Synchronous time
	Distribution of practices over the long, medium and short term	RP1=0	RU1=0	RI1=0	RM1=0	RS1>0
Master Production planning	Usage of computer for forecasting	RP2>0	RU2=0	RI2=0	RM2=0	RS2=0
	Usage of qualitative techniques for forecasting	RP3<0	RU3=0	RI3<0	RM3=0	RS3=0
	Usage of quantitative techniques for forecasting	RP4>0	RU4=0	RI4>0	RM4=0	RS4=0
	Customer power to affect the determination of delivery date (p. 239)	RP5=0	RU5=0	RI5<0	RM5<0	RS5=0
	Responsiveness of the production system to market changes (p.227)	RP6<0	RU6=0	RI6=0	RM6<0	RS6=0
Material planning	Number of inventory turns (p.224)	RP7=0	RU7=0	RI7=0	RM7>0	RS7=0
	Multiple source for assuring supply (p.225)	RP8>0	RU8<0	RI8=0	RM8=0	RS8=0
	Importance of contract for assuring supply (p.225)	RP9=0	RU9>0	RI9=0	RM9=0	RS9>0
	Vendors per purchased part (p.242)	RP10=0	RU10<0	RI10=0	RM10=0	RS10=0
	Importance of personal relationships in the relation with suppliers	RP11<0	RU11=0	RI11<0	RM11=0	RS11=0
	Degree of difficulty faced of sharing information with supplier	RP12>0	RU12=0	RI12<0	RM12=0	RS12<0
	Degree of difficulty faced to implement collaborative planning with supplier	RP13>0	RU13=0	RI13<0	RM13=0	RS13=0

Capacity requirements planning	*Means of decreasing capacity*					
	Layoff	RP14=0	RU14<0	RI14<0	RM14=0	RS14=0
	Undertime	RP15=0	RU15>0	RI15>0	RM15=0	RS15=0
	Means of increasing capacity					
	Overtime	RP16=0	RU16=0	RI16=0	RM16=0	RS16<0
	Build inventory	RP17=0	RU17>0	RI17=0	RM17=0	RS17>0
	Subcontracting	RP18=0	RU18=0	RI18=0	RM18<0	RS18>0
Releasing orders	Level of centralization of the function	RP19>0	RU19=0	RI19=0	RM19=0	RS19=0
	Usage of capacity information	RP20>0	RU20=0	RI20=0	RM20>0	RS20=0
	Usage of backlog information	RP21<0	RU21=0	RI21=0	RM21<0	RS21=0
	Usage of information from the forecast	RP22>0	RU22=0	RI22=0	RM22=0	RS22=0
Shop-floor management	Accuracy of feedback data	RP23<0	RU23>0	RI23=0	RM23>0	RS23=0
	Employee dependency on superiors in making decisions	RP24>0	RU24=0	RI24=0	RM24=0	RS24=0
	Standardization of work instructions	RP25=0	RU25>0	RI25=0	RM25=0	RS25=0

Table 9 - Summary of the influences of culture on PPC functions

5. Conclusion

This study shows the importance of national cultures when applying practices which had been developed in another culture. Practices that work well in one country won't necessarily show the same performance in a different national culture context. Instead of spending efforts trying to impose practices, managers should question themselves how to adapt practices and approaches to their own cultural characteristics.

Several researches have been trying to understand which differences among cultures drive the way practices and approaches should be implemented in order to be more efficient. Most of these studies have been developed in the field of quality management. The literature lack studies on the impact of culture on Production Planning and Control.

In this context, the purpose of this work was to study the interaction between national culture and Production Planning and Control and to find out which aspects of the Production Planning and Control system can be influenced by national culture. The results show that there are several aspects of PPC systems which are influenced by national culture and serve as a guide for organizations to adapt their PPC system practices to their cultural environment and improve the overall performance of the production system.

Further analysis should be done in order to assess the strength of each relation found in this work, such as a correlation analysis.

References

AQUILON, M. Cultural dimensions in logistics management: a case study from the European automotive Industry. **Supply Chain Management**, v. 2, n. 2, p. 76–87, 1997.

BLACKMON, K.; VOSS, C. Differences in manufacturing strategy decisions between Japanese and Western manufacturing plants: the role of strategic time orientation. **Journal of Operations Management**, v. 16, n. 2, p. 147-158, 1998.

CERRA, A. L.; BONADIO, P. V. G. As relações entre estratégia de produção, TQM (total quality management ou gestão da qualidade total) e JIT (just-in-time) – estudos de caso em uma empresa do setor automobilístico e em dois de seus fornecedores. **Revista gestão e produção**, v. 7, n. 3, p. 305-319, 2000.

CORRÊA, H. L.; GIANESI, I. G. N.; CAON, M. **Planejamento, Programação e Controle da Produção**. São Paulo: Atlas, 2001.

EARLEY, P.C. Playing Follow the Leader: Status-Determining Traits in Relation to Collective Efficacy across Cultures. **Journal Organizational Behavior and Human Decision Processes**, v. 80, n. 3, p. 192–212, 1999.

EARLEY, P.C. Social loafing and collectivism: a comparison of the United States and the People's Republic of China. **Journal Administrative Science Quarterly**, v. 34, n. 4, p. 565–581, 1998.

FLYNN, B. B.; SALADIN, B. Relevance of Baldrige constructs in an international context: A study of national culture. **Journal of Operations Management**, v. 24, n. 5, p. 583–603, 2006.

FRIEDMAN, T.L. **The world is flat**: A brief history of the twenty-first century. New York: Farrar, Straus and Giroux, 2005.

GAITHER, N. **Production and operations management.** Fort Worth, TX : Dryden Press, 1992.

GIL, A. C. **Como elaborar projetos de pesquisa**. São Paulo: Atlas, 1991.

GONÇALVES, G. A.; MIURA, I. K. Executivo expatriado no Brasil: as implicações das características culturais brasileiras. **Revista FAE, Centro Universitário Curitiba**, v. 12, n. 1, p. 133-147, 2009.

GRAVES, S. C. **Manufacturing Planning and Control**. Massachusetts Institute of Technology, 1999.

HARRISON, G.; MCKINNON, J.; PANCHAPAKESAN, S.; LEUNG, M. The influence of culture on organizational design and planning and control in Australia and the United Sates compared with Singapore and Hong Kong. **Journal of International Financial Management and Accounting**, v. 5, n. 3, p. 242-261, 1994.

HAYES, R. H.; WHEELWRIGHT, S.C.; **Restoring Our Competitive Edge**. New York: Wiley, 1984.

HILL, T**. Manufacturing Strategy**: Text and Cases. Homewood, Irwin, IL. 1989.

HOFER, C.; SCHENDEL, D**. Strategy Formulation: Analytical Concepts**. New York: West Publishing, 1978.

HOFSTEDE'S CULTURAL DIMENSION. Avaiable at: <http://www.geert-hofstede.com/>. Accessed at 04/2010.

HOFSTEDE, G. **Culture's Consequences:** Comparing Values, Behaviors, Institutions and Organizations Across Countries. Thousand Oaks, CA: Sage Publications, 2001.

HOUSE, R.; JAVIDAN, M.; HANGES, P.; DORFMAN, P. Understanding cultures and implicit leadership theories across the globe: an introduction to project GLOBE**. Journal of World Business**, v. 37, n. 4, p. 3-10, 2002.

HOUSE, R.J.; HANGES, P.J.; JAVIDAN, M.; DORFMAN, P.W.; GUPTA, V. **Culture, Leadership and Organizations:** The GLOBE Study of 62 Societies. Thousand Oaks, CA: SAGE, 2004.

KALE, S. H.; DE, S. **Business papers**. Culturally Compatible Websites: Applying Trompenaars Dimensions to Web Design. Available at: <http://works.bepress.com/sudhir_kale/13>. Accessed at 08/2010.

KATZ, J. P.; SHEU, C.; PAGELL, M. The importance of national culture in operations management research International. **Journal of Operations and Production Management**, v. 25, n. 4, p. 371-394, 2005.

KULL, T.J.; WACKER, J.G. Quality management effectiveness in Asia: The influence of culture. **Journal of Operations Management**, v. 28, n. 3, p. 223-239, 2010.

LAURENT, A. The cross puzzle of international human resources management. **Human Resouce Management Journal**, v. 25, n. 1, p. 91-102, 1989.

MATHEWS, B. P. et al. European quality management practices: The impact of national culture. **International Journal of Quality and Reliability Management**, v. 18, n. 7, p. 692-707, 2001.

METTERS, R. ‘‘The way that can be told of is not an unvarying way’’: Cultural impacts on Operations Management in Asia. **Journal of Operations Management,** v. 8, n. 3, p. 177-185, 2010.

MILLER, J.G.; ROTH, A.V. A taxonomy of manufacturing structures. **Management Science Journal**, v. 40, n. 3, p. 285–304, 1994.

MINTZBERG, H. **Structures in fives: designing effective organizations**. Englewood Cliffs: Prentice-Hall, 1983.

NAZARENO, R. R**. Desenvolvimento de sistemas híbridos de planejamento e controle da produção com foco na manufatura enxuta**. Dissertação (Doutorado) - Escola de Engenharia de São Carlos, Universidade de São Paulo, São Carlos. 2008.

NAOR, M. et al., The globalization of operations in Eastern and Western countries: Unpacking the relationship between national and organizational culture and its impact on manufacturing performance. **Journal of Operations Management**, v. 28, n. 3, p. 194-205, 2009.

NYHUIS, P**. Fundamental of Production Logistics**: Theory, Tools and Applications. Heidelberg: Springer-Verlag, 2009a

NYHUIS, P. **Configuration and regulation of PPC**. Berlin / Heidelberg: Springer, 2009b

NYHUIS, P. Individual Configuration of Production Control to Suit Requirements. **World Academy of Science**, v. 59, n. 9, p. 47-52, 2009c

RODRIGUES, C. Cultural Classifications of Societies and How They Affect Cross-Cultural Management. **Cross Cultural Management: An International Journal**, v.5, n.3, p. 31-41, 1998.

SCARPELLI, M. **Sistemas de Produção agroalimentar**: arquitetura para as funções de planejamento e controle da produção. Tese (outorado) – Universidade Federal de São Carlos, São Carlos, 2004.

SCHEIN, E. **Organizational Culture and Leadership**. San Francisco: Josey Bass, 1985.

SCHWARTZ, S. H. **Beyond individualism/collectivism**: New cultural dimensions of values. Thousands Oaks, CA: Sage, 1994

SCC - SUPPLY CHAIN COUNCIL, **Supply-Chain Operations Reference model (SCOR) Version 9.0.** Available at: <http://www.supply-chain.org>. Accessed at 05/2010.

SLACK, N. et al. **Administração da produção**. São Paulo: Atlas, 1999

SMITH, P.B. When Elephants fight, the grass gets trampled: the GLOBE and Hofstede projects. **Journal of International Business Studies,** v. 37, n. 6, p. 915-921, 2006

SWAN, J.; NEWELL, S.; ROBERTSON, M.. The diffusion, design and social shaping of production management information systems in Europe. **Journal of Information Technology and People**, v. 13, n. 1 p. 27-46, 2000.

TROMPENAARS, F.; LLOYD, B. Culture and Change: Conflict or Consensus? **Leadership and Organizational Development Journal**, v. 14, n. 6, p 17-23, 1993.

TROMPENAARS, F . **Did the pedestrian die?**
Insights from the world's greatest culture guru. Oxford: Capstone, 2003.

TROMPENAARS, F.; HAMPDEN-TURNER, C. **Riding the waves of culture: understanding cultural diversity in business**. 2rd ed. London: Nicholas Brealey Publishing, 1999.

VECCHI, A.; BRENNAN, L. Quality management: a cross-cultural perspective. **Cross Cultural Management: An International Journal,** v. 16, n. 2, p. 149-164, 2009.

VOLLMAN, T. E. et al. **Manufacturing planning and control systems**. New York: Irwin McGraw-Hill, 1997.

VOSS, C.; BLACKMON, K. Differences in manufacturing strategy decisions between Japanese and Western manufacturing plants: the role of strategic time orientation. **Journal of Operations Management,** v16, n. 2-3, p. 147–158, 1998.

WACKER, J.G.; SPRAGUE, L.G. Forecasting accuracy: comparing the relative effectiveness of practices between seven developed countries. **Journal of Operations Management**, v.16, n. 2-3, p.271–290, 1998.

WHYBARK, C. C.; VASTAG, G. **Global Manufacturing Practices:** A Worldwide Survey of Practices in Production and Control. Amsterdam: ELIESER, 1993.

WIENDAHL, H. Stumbling blocks of PPC: Towards the holistic configuration of PPC systems. **Production Planning and Control Journal**, v. 16, n. 7, p 634- 651, 2005.

YOO, D. K.; RAO S. S.; HONG, P. A comparative study on cultural differences and quality practices – Korea, USA, Mexico, and Taiwan. **International Journal of Quality and Reliability Management**, v. 23, n. 6, p. 607-624, 2006.