HOW LEADERSHIP STYLES, AUTONOMY AND CONSCIOUSNESS LEVELS AFFECT TEAMWORKING EFFECTIVENESS ON THE SHOP FLOOR?

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ABSTRACT

The purpose of this paper is to describe how leadership profile, teams' level of autonomy and team members' consciousness level interact to affect teams' effectiveness in terms of knowledge management. To achieve this overall objective, this paper established, based on literature, a theoretical-conceptual model (construct) that relates the variables, namely, leadership profile in teams, autonomy of work within teams, team members' consciousness levels and teams' effectiveness, in order to validate the proposed model with specialists on the related areas. The research method adopted was the Delphi method, which proposes the deduction and refinement of opinions of a group of experts, whose intention is to find the common sense of the opinions of these specialists through questionnaires and feedback. Specialists concluded that, the higher the complexity of team members' consciousness level and their values, the more effective are the more autonomous teams' design and the more democratic leadership approaches. This proposed model was validated by the specialists, enabling the implementation of a quantitative survey on companies with different profiles, in order to aplly the defined model on actual shop floor teams to test its effectiveness on predicting how effective a team can be depending on their members' level of consciousness and values and the leadership approaches.

Keywords: Human Values. Consciousness Levels. Teamworking. Knowledge Management. Shop Floor. Delphi Method.

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INTRODUCTION

Knowledge management on the shop floor is a process that integrates tacit and explicit knowledge between humans, looking for improvements, enhancing the organizational performance (MUNIZ et al., 2011).

Chang, et. al (2015) found that job-oriented cultures have positive effects on employee intention in the knowledge management process, while a tightly controlled culture has negative effects.

Most of the literature available defines work teams as a group directed by a leader who makes the most of the decisions. In contrast, they also refer about a self-managing or autonomous work team, when employees are involved in making decisions (COHEN, 1997).

According to Salerno (1991), in Semiautonomous Groups, the freedom of those teams and decentralization in decision making, grant higher mobility and flexibility in the productive sector, generating a favorable environment for product, process and organizational innovations.

Marx (1998) presents the Enriched Groups as a less autonomous type of work group, with a restricted level of assignments and focusing in operational improvements in the working environment. These limitations (according to the author) would reduce the possibilities for growing professional skills among team members and also their potential contribution for more strategic improvements.

Bastos & Cordeiro (2016), in a systematic literature review, found a gap in the literature regarding the relationships between the consciousness levels of teams' members, their autonomy and the effectiveness of knowledge management on the shop floor, proposing a new study to establish these relations.

This research project has the following general objective: To describe how leadership profile, teams' level of autonomy and team members' consciousness level interact to affect teams' effectiveness in terms of knowledge management.

1 THEORETICAL FRAMEWORK

This section begins with a literature review on the Knowledge Management on the Shop Floor.

1.1 KNOWLEDGE MANAGEMENT ON THE SHOP FLOOR

Being aware that knowledge is the result of associative parts in the brain, Bennet (2010) considered knowledge as comprising two parts:

1. Informing Knowledge: is the information part of knowledge;
2. Proceeding Knowledge: represents the process part of knowledge, in other words, the process of selecting, associating and applying the relevant information (knowledge informing).

When two or more individuals exchange any part of their knowledge between them, they are involved in knowledge sharing (BARTOL AND SRIVASTAVA, 2002). Considering learning opportunities, this exchange process is something that not only does the knowledge receiver benefit from its acquisition, but the act of sharing can also promote learning on the part of the knowledge provider.

Knowledge management on the shop floor is a process that integrates tacit and explicit knowledge between humans, looking for improvements, enhancing the organizational performance (MUNIZ et al., 2011).

Educating employees for being active and giving them the authority to evaluate and change their own situations leads to participation. In this case, the employees take responsibility for their own situation, and feel motivated by experiencing proposals and ideas to develop the organization further (HALLGREN, 2003).

Chang, et. al (2015) found that job-oriented cultures have positive effects on employee intention in the knowledge management process, while a tightly controlled culture has negative effects.

In a survey developed by Nakano, et. al (2013), they indicated that an engaging environment facilitates the sharing of tacit knowledge. An engaging environment is based in intense communication and a strong sense of collegiality and a social climate that is dominated by openness and trust.

Trust in colleagues moderates the relationship between affective commitment and knowledge sharing and the relationship between cost of knowledge sharing and knowledge sharing (CASIMIR, et. al, 2012).

If goal orientations get associated with the types of individuals who are willing to share and with whom they are willing to share, these practices also may facilitate coworker's relationships. This intent to help employees develop awareness of each other, a common language, and the trust that facilitates the sharing of knowledge (SNOWDEN, 2000).

Knowledge sharing processes are enabled by awareness of roles, mutual respect and the level of trust between employees (CN WEE, et. al, 2013).

Israilidis, et. al (2015) suggest that employees ignorance affect negatively their intention to share knowledge, turning both decision-making and communication poorly. That could also limit the organizational ability to prevent external risks, implement innovation and manage future risks.

1.2 TEAMWORK ON THE SHOP FLOOR

Most of the literature available defines work teams as a group directed by a leader who makes the most of the decisions. In contrast, they also refer about a self-managing or autonomous work team, when employees are involved in making decisions, managing projects (COHEN, 1997).

The first scientific administration theories (classical theory) were idealized by Frederick Taylor (at the first half of 20th century) seeking a higher productivity, without caring about the workers conditions, combining military principles with engineering (WOOD JR, 1992). Taylor believed that workers did not have capacity or knowledge to analyze his work in a scientific manner (TAYLOR, 1964). At the same decade, Henry Ford changed the concept of productivity and innovated with mass production idea, seeking the standardization of process, machines, products and labor (WOOD JR, 1992).

In the second half of 20th century, the Taylorist model began to evolve. Taylor did not consider worker's satisfaction or people's development, which became to be cogitated on that period (SLACK, et. al, 2009). The principle of the new approach (behavioral) was to reduce alienation and increase motivation.

After the end of the Second Great War, the sociotechnical approach began to be studied and applied, led by Eric Trist, seeking improvements in the mining English sector. The main idea is that the teamworking became the central point rather than the individual, developing workers abilities and knowledge (MARX, 1994). The sociotechnical approach also considers that peoples' behavior towards work depends on the form of organization of this work and the content of those tasks to be executed, because the feelings associated to this work (responsibility, realization, recognition), are fundamental for the individual to be proud of himself (BIAZZI JR, 1994). This kind of teamworking was implemented in Volvo's plants Kalmar and Uddevalla (MARX, 1994).

The 50's Market conditions in Japan, led the old production paradigm to change into a new adapted one, the paradigm of Lean Production (Toyota Production System) based on Taylorists concepts but adapted to Japanese conditions and culture (CORDEIRO, 2007). Womack et. al (2004) argue that the need to produce economically a wide variety of models was the main market motivation for Toyota's changes in the early 1950s.

To understand the different types of teamworking along the decades, Marx (1998) presented two models of work teams referring to them as working groups at the shop floor:

- Enriched groups;
- Semiautonomous groups

Exhibit 1 presents a framework with the basics definitions of teamworking. Exhibit 2 shows four general working teams models, classified by its autonomy. Exhibit 3 and 4 details the differences between all those teamworking designs.

Exhibit 1 – Framework's Autonomous vs Non autonomous groups.

Groups Type	Secondary Definition
Autonomous	Team members are free to decide (together) how their work should be done, including autonomy in HR.
Non Autonomous	They are told not only what to do but how to get the job done.

Source: Adapted from Devaro (2008).

Exhibit 2 – Framework's Groups Type.

Groups Type	Secondary Definition
Non autonomous	Without autonomy
Enriched	Pre Enriched Groups Enriched Group Level 1 Enriched Group Level 2
Semi-Autonomous	Semi-Autonomous Level 1 Semi-Autonomous Level 2 Semi-Autonomous Level 3
Autonomous	Full autonomy

Source: Adapted from Marx (1998).

According to Salerno (1991), in Semiautonomous Groups, the freedom of those teams and decentralization in decision making, grant higher mobility and flexibility in the productive sector, generating a favorable environment for product, process and organizational innovations.

Marx (1998) points that the enriched groups have a restricted level of autonomy and assignments, focusing in operational improvements in the working environment. These limitations (according to the author) would reduce the possibilities for growing professional skills among team members and also their potential contribution for more strategic improvements.

According to the same author, the term "team" is attractive because it connotes bounty types of activity. It brings the vocabulary of sports and also the shop floor.

Lucio, Jenkins and Noon's (2000) see a difference while defining teamworking. At the first it means to incite competition between employees, and on the other hand it could be a manner to nourish employee's empowerment, as can be seen, according to the authors, in parts of the Swedish or German industrial contexts.

One influencing factor for the teams' formation is that people who are part of them have thoughts, personalities and different formations, what can be a hindering factor for the group's synergy (SACOMANO, 2000).

Luis Alves Pais (2010), on his study on self-managed teams, pointed out that there is an increase of commitment and productivity, when people experience autonomy.

Wzoreck and Cordeiro (2015) conducted a research within three companies in the auto parts industry in the state of Paraná, exploring both enriched and semi-autonomous groups in a more deeply fashion, and found that autonomy depends on formation, training, maturity and motivation. Deepening Marx's teamworking concepts, they provided a framework to classify teams on the shop floor level, splitting both Enriched Groups and Semi-autonomous Groups into subtypes, as shown in Exhibits 2 and 3.

Exhibit 3 – Framework Enriched Groups

Enriched Groups	Autonomy's Level	Based on Toyota's System
Enriched	Restricted autonomy.	Strongly based on the accountability concept and versatility on the local management. Controlled by supervisors, autonomy here is not a priority. The team focus is on seeking multifunctionality via function rotating and the enrichment by improvement suggestions. Professional growth is restricted, the same way strategic contribution is.
Pre-Groups Enriched	Without autonomy.	Employees are eventually involved in improvement groups (Quality Control Groups or Task Forces), without autonomy in decision making (Toyota 1950).
Enriched Group Level 1	Low levels of Autonomy	Reasonable autonomy related to Production Management, with low levels of autonomy within Human Resources and Planning Management (Toyota 1970).
Enriched Group Level 2	High levels of Autonomy and Flexibility	These groups are a transitional model to Semiautonomous Groups. What characterize these kinds of groups are the high levels of autonomy within Production Management (Toyota 1990).

Source: Adapted from Marx (1998).

Exhibit 4 – Framework Semi-Autonomous Groups

Semi-Autonomous Groups	Autonomy's Level	Based on Volvo's Development
Semi-Autonomous	Autonomy and Flexibility	Great potential for professional member's growth, since focusing autonomy and flexibility. The main principle of this kind of organization is the member's participation in defining and changing projects, seeking simultaneously enlargement and enrichment.
Semi-Autonomous Level 1		Still a transitional type in which the greatest difference related to Enriched Groups Level 2 refers to levels of autonomy in HR Management. The main example of this level of autonomy is the Volvo plant in Kalmar. (Volvo 1970).
Semi-Autonomous Level 2		This is the beginning of the appearance of a self-managed team's characteristics. Autonomy of Production Management begins to increase its levels, the same way with HR Management. In turn, the autonomy of Planning Management begins to be present. The main example of this level of autonomy is the subsidiary Toyota's plant of Kyushu.
Semi-Autonomous Level 3		These groups are the apex of autonomy's level in work teams on the shop floor, which configures a self-managed team. Here, employees have a high level of autonomy within Production Management and HR Management, also a considerable autonomy in Planning Management. The main example of this level of autonomy is the Volvo plant in Uddevalla (Volvo 1980).

Source: Adapted from Marx (1998).

By another side, Devaro (2008) found that there is no statistically significant difference between the predicted gains from autonomous against non-autonomous teams. This conclusion opposes in a radical way what the authors presented in the former paragraph, reinforcing the need of this research.

1.3 HUMAN VALUES AND CONSCIOUSNESS LEVELS

Values could be described as ‘‘a personal view on what is most important in life, and consequently guides human behavior” (HINES, 2011, p188).When an individual is aware of himself he is possible to make decisions for intentional changes, which relates to his own values (HINES, 2011).

Teams operating at high performance level represent the peak in human efficiency, creativity and innovation. Hence the creation of business environments designed to develop such teams is increasingly a major objective for businesses that want to remain competitive, and improve its performance.

How it is possible to positively motivate employees in the face of increased demands, particularly when they are being asked to meet these demands with fewer resources?

Inglehart’s (1997) theory of intergenerational value change suggests that one’s level of ‘‘existential security’’ is the key factor. It’s not necessarily how much money one has, but how secure one feels.

Considering knowledge as having a number of levels of comprehension, these levels (human data) growth from simple to complex turning out the different attributes of knowledge, providing some manners to measure and to understanding individual’s values and consciousness (BENNET et. AL, 2010).

People think and act in different ways. A brother and sister, husband and wife, manager and employee, corporation and its clients might have very different world views and values (BECK; COWAN, 2014). So the reasons for acting in particular ways change, as do the behaviors.

Spiral Dynamics describes biopsychosocial systems in form of an expanding spiral. The term biopsychosocial reflects Dr. Graves’ insistence on a multidisciplinary approach to understanding human nature (BECK; COWAN, 2014):

- Bio: for the neurology and chemical energy of life;
- Psycho: for the variables of personality and life experiences;
- Social: for the collective energy in group dynamics and culture as the interpersonal domain influences human behavior;
- System: for the interdependence and action/reaction of these three upon one another in a coherent whole.

Exhibit 5 - What people in each worldview seek out in life

Color	Color	Human Characteristics
1	Beige	Survival; biogenic needs satisfaction; reproduction; satisfy instinctive urges; genetic memory.
2	Purple	Placate spirit realm; honor ancestors; protection from harm; family bonds; respect elders; safety for tribe.
3	Red	Power/action; asserting self to dominate others and nature; control; sensory pleasure; avoid shame.
4	Blue	Stability/order; obedience to earn reward later; meaning; purpose; certainty; Truth; the reason to live and die.
5	Orange	Opportunity/success; competing to achieve; influence; autonomy; mastery of nature; understanding self.
6	Green	Harmony/love; joining for mutual growth; awareness; belonging; spirituality and consciousness.
7	Yellow	Independence/self-worth; fitting a sustainable living system; knowing; the big questions; the long view.
8	Turquoise	Global community without exploitation; understanding of life energies; survival of life on a fragile Earth.

SOURCE: Adapted from COWAN, TODOROVIC, 2000.

The aspect of the Graves SD theory is described with the two color families. The warm colors (beige, red, orange, yellow, etc.) exhibits an express-self way of living with a focus on the external and how to change and master it (with an internal); it is how that expressiveness occurs that differentiates the levels (BECK; COWAN, 2014).

The cool colors (purple, blue, green, turquoise, etc.) have a sacrifice-self way of living with a focus on the inner world and how to stabilize and come to peace with it (with an external). The Spiral winds between a series of individual "I" and collective "we" as it turns between cool, deny-self group systems, and warm, individualistic express-self systems (BECK; COWAN, 2014).

The organizations could adjust its management system to fit the person; the school could match teacher, student, and method. If not, it will lose mind power and interest as the person moves elsewhere. Getting the right person into the right job with the right materials at the right time within the right systems and structures is what SD is about (BECK; COWAN, 2014).

The World Values Survey (WVS) and Ray's Cultural Creative are other values-based systems that are similar as Maslow's Hierarchy of Needs and Beck's Spiral Dynamics (HINES, 2013).

During the middle age, traditional values were dominant. Modern values came and gained in numbers, with the advent of industrial revolution. After that, postmodern values emerged with the information and service society just some years ago, and Integral values, the newest on the scene, emerged perhaps a decade or two (HINES, 2011).

Sharon, et. al (2004) made cross-cultural comparisons, collecting data from Hungary, Italy, UK and USA workers. The authors found that values influence one's organizational commitment and that human values might be influenced by national culture. It is also needed to appoint that cultural values affects human values, which in consequences impacts on teamworking, a data found by Taewon (2013).

Worker's unconsciousness may negatively affect the intention to share knowledge, consequently guiding to a weak decision-making and communication in organizations. Also, it limits the organization in some aspects like the ability to refuse external risks, implement innovation and managing risks (ISRAILIDIS, et. al, 2015). On the empirical study made by Matzler, et. al (2008), it was clearly identified that individuals consciousness impacts knowledge sharing.

Then the challenge is to communicate, develop, motivate, and manage those people in ways that fit who they are now and prepare systems for who people will become next (BECK; COWAN, 2014).

1.4 LEADERSHIP STYLES

Leaders in an information-rich society must develop some of the aptitudes and attitudes of a generalist (CLEVELAND, 2002). High-performing leaders have deep knowledge of the general business environment, their industry, company, and work group, and their organization's strategy, culture, and values. A good leadership approach is the one that best meets subordinates motivational needs, team performance, goal achievement and improvement of organization outcomes (KAISER, HOGAN, & CRAIG, 2008).

In a survey made by Stoker (2007), it was found that team members with a short team ownership reported higher levels of individual performance when their team leader demonstrated directive behavior.

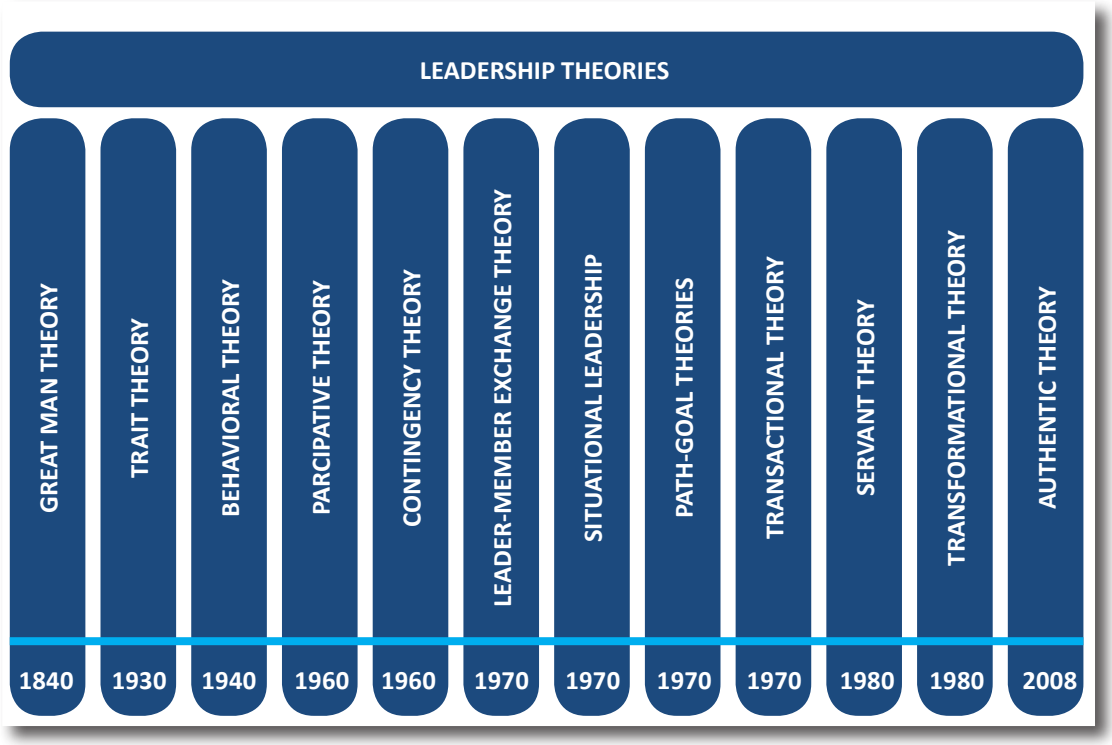
Also, Stoker (2007) found that these new team members reported lower levels of individual performance and experienced greater emotional exhaustion when their team leader adopted coaching behavior. For team members with longer team ownership, however, individual performance was greater and emotional exhaustion less when their team leader exhibited a coaching style of behavior.

Ingvaldsen, et. al (2012) based on arguments built on a case study within a manufacturing company, concluded that inter-group coordination becomes a major challenge when groups enjoy high levels of autonomy, also reporting that work groups are not widely used in industry.

A concern about effective leadership styles is also present on field of ancient philosophy. The quest for the ideal type of the leader has been a topic of interest since dawn of man. Different theories have emerged to explain leaders and followers behavior and there is been a lot of discussion on which leadership profile is the most effective.

In the early 20th century, studies about leadership were taken up in earnest, focusing on different leadership theories. These theories are present in the following time line (Figure 1).

Figure 1 – Leadership Theories Timeline



Source: The authors (2017)

The Great Man theory proposed that certain individuals are gifts from God, men who born to lead and uplift human existence (CARLYLE, 1840). This theory was also related as trait theory. The difference between them is that the Great Man formulation is more about a statement of faith than a theory, what does not fit on contemporary scholarly theory and research (DAY et.al, 2014). A peculiarity that emphasizes the eccentric qualities that set effective leaders apart from less effective ones may be seen as a more recent view of the Great Man theory, i.e., trait theory (NORTHOUSE, 2013).

After trait theory, behavioral theory emerges to focus on leader behaviors instead of their mental, physical or social characteristics. Personality literature points that leader behaviors mediate the relationship between traits and effectiveness (BARRICK & MOUNT, 1993).

The effect of participative leadership behavior of superiors on subordinates work performance can be explained by two theoretical models. *The motivational model* allows subordinates to have more opportunities to participate in decision making,

increasing performance through enhanced motivation (SASHKIN, 1976). This type of leadership behavior reduce subordinates' sense of powerlessness, increasing their feelings of self-efficacy and control (ARNOLD, ARAD, RHOADES,& DRASGOW, 2000). The exchange-based model asserts that well treated employees show high levels of work performance, giving an extra effort to contribute to their organization (BLAU, 1964; MOORMAN, 1991; ORGAN, 1988).

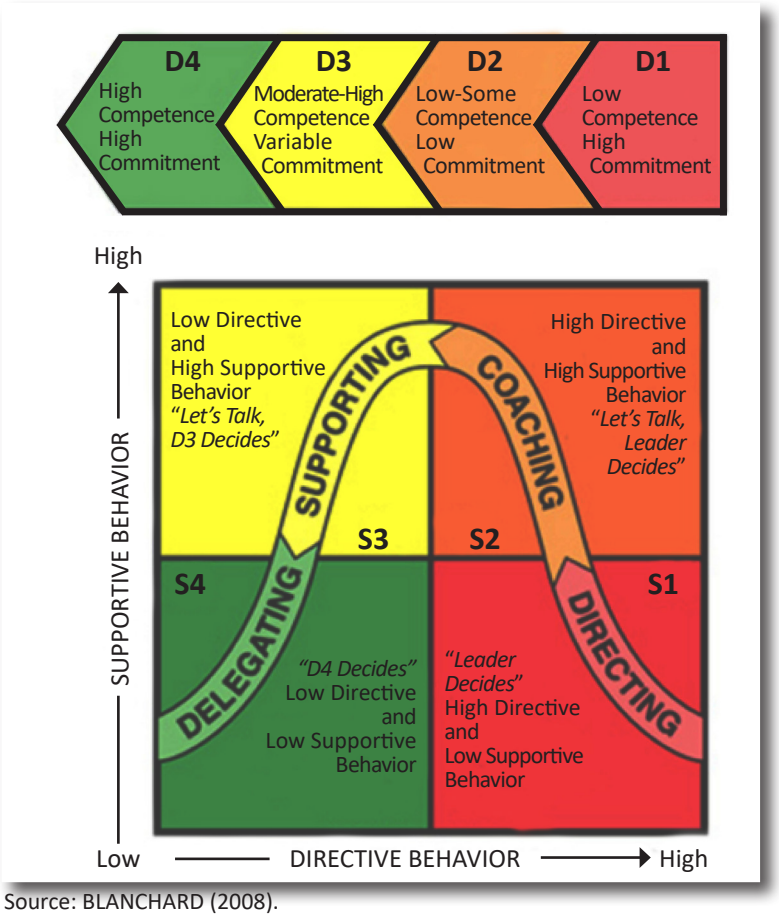
Considering measures of an individual leadership potential as valid and trustworthy, the contingency theory of leadership predicts, based on personal orientation, in which kind of situation a specific leader will be more effective. Within contingency theory, styles of leadership are described as task oriented, when leaders are focused on reaching organization goals and relationship motivated, and people oriented, when leaders are concerned about create lasting relationships with employees and organizations. Contingency theory emphasizes that leaders will not be successful in all situations. If an individual's orientation does not fit the situation, he/she will probably fail at the job. If a leader style is a good match for the situation, then he or she will be more likely to succeed. Within this approach, it is an organization role to place leaders in properly situations (KRIGER AND SENG, 2005; YUN, 2006; FINKELSTEIN, 2008).

Leader-member exchange (LMX) emerges as a theory that focuses on relationship between leader and followers. It is based on a set of experiments on which, on the process of role development, the supervisor determines the role taking, role making and role routinization. The leader forms an "ingroup", selecting few employees to develop a close relationship. The "outgroup" is formed by the remaining employees. The trusted followers of the ingroup are given tasks with more content and responsibilities, including more autonomy and decision-making, while those belonging to the outgroup absorbs the formal job responsibilities. In such experiments, it was verified that ingroup members performs a better high-quality exchange than the outgroup ones. Relationships with high-quality LMX are built with trust, mutual sharing and open communication. In other hand, low-quality LMX relationships are limited to minimal resource exchanges and contractual-type obligations (GERSTNER & DAY, 1997; GRAEN NOVAK & SOMMERKAMP, 1982; ANAND, VIDYARTHI, LIDEN, & ROUSSEU, 2010; WALUMBWA, CROPANZANO, & GOLDMAN, 2011).

Proposed to provide leaders with the flexibility to adopt a leadership style that fits better to the needs of followers, situational leadership theory imply that leaders should adapt their leadership style with reference to the skills, readiness and progress level of team members. Practicing situational leadership, demand leaders to pay attention on the perceptions of their followers (KOUZES, 2004; HERSEY, 2008; BLANCHARD, 2008). The leadership styles of situational leadership include (see figure 2):

- Style 1 (S1) “Directing” characterized by “high task and low relationship” behaviors;
- Style 2 (S2) “Coaching” characterized by “high task and high relationship” behaviors;
- Style 3 (S3) “Participating” characterized by “high relationship and low task” behaviors.
- Style 4 (S4) “Delegating” characterized by “low relationship and low task” behavior (HERSEY, 2008; BLANCHARD, 2008).

Figure 2 – Leadership Situational Styles



Source: BLANCHARD (2008).

Similarly to situational theory, in which the responsibility of the leader is to assess each particular situation and be flexible enough in his or her leadership style, path-goal theory is essential to understand leadership. This theory was used to recognize the best leadership model to motivate subordinates to reach organizations goals. This theory supports the idea that motivation is an important issue in how subordinates interact with their supervisors, resulting in the overall success of the subordinates. Aiming to

make path-goal theory more comprehensive, House (1996) included some aspects from transactional and transformational views of leadership. Transactional leadership exists when leaders and followers exchange gratifications. Defining together the amount and type of compensation when work is finished on time and setting terms of work to be completed. Transactional managers set expectations, objectives and assign tasks for the employees to achieve organization's desired performance. They also create norms and measures for employees, in order to prevent mistakes (MARTIN, 2015).

To create significant change in the organization, transactional model is not enough. For better results, transformational leadership can be applied when supervisors expect followers to be motivated to do more than was expected by, moving individuals to fulfill their higher-level needs. Transformational leaders inspire employees to focus on the common interests of the company and of their colleagues as a group (MARTIN, 2015).

Currently, the technology and employee well-being has been the main factor of progress and development. Organizations are in need of more ethical leaders, people-centered management and supervisors inspired from servant leadership (LUTHANS, 2002; MACIK-FREY, QUICK & COOPER, 2009). A servant leader is one that is able to create opportunities within the organization that can benefit followers' growth (LUTHANS & AVOLIO, 2003). Servant leaders have the role of a flight attendant who holds the organization in trust (REINKE, 2004). Servant leaders are interested in helping others instead of their self-interest. Luthans & Avolio (2003) called this "the need to serve", which is more important than "the need for power".

Moderating the relationship between affective organizational commitment and trust in leadership, the authentic leadership (AL) became an important tool to promote positive ethical climate and fostering positive self-development and creativity in subordinates. Acknowledge as the ´´true self`` expression, which is described as ´´being your own person``, AL is a transparent, genuine, and morally positive leadership style, used to promote positive behavior and positive attitude in followers. A leader that knows his authentic self, practices his principles and values, balances his extrinsic and intrinsic motivations and empowers people to lead have a natural capacity to foster authentic leadership (LUTHANS & AVOLIO, 2003; GEORGE, 2003; GEORGE, 2007; WALUMBWA, 2008).

1.5 LEADERSHIP STYLES, GROUP AUTONOMY AND KNOWLEDGE MANAGEMENT EFFECTIVENESS

On the systematic literature review made by Bastos & Cordeiro (2016), the authors found many works focusing on how human values affect teams and their performance regarding knowledge management. It was also possible to find many papers focused on the interplay of organizational and teams design, knowledge management and

sharing and human values. Nevertheless, a gap was identified on the subject of how human values impact on teamworking design and management in order to maximize knowledge management on the shop floor, being the opportunity for a new study. Exhibit 6 presents the main features of this model, based on the systematic literature review performed by Bastos & Cordeiro (2016).

Exhibit 6 – Proposed Model for defining the most effective team design considering different team members with different counsciousness levels and different production contexts based on production and product technological complexity (Based on BASTOS & CORDEIRO, 2016).

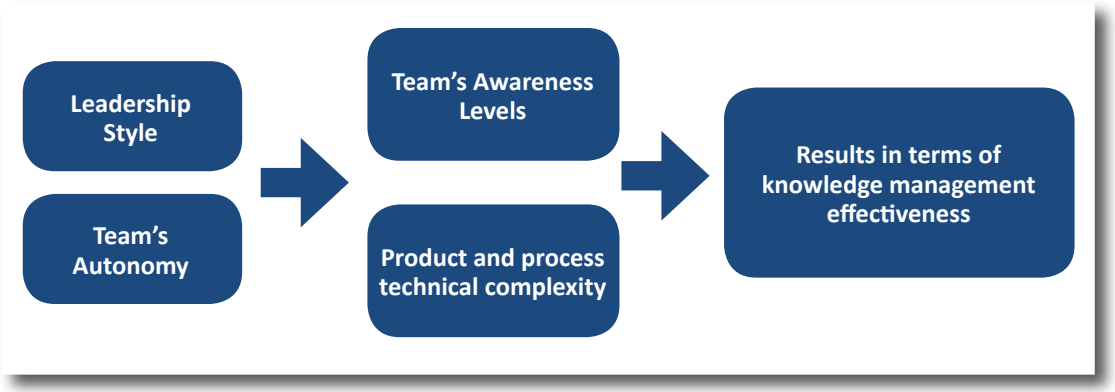
OTHER FACTORS				CONSCIOUSNESS LEVELS
Level of Production's Complexity	Technological Proccess' Profile	Products' Profile	Team's Design	Consciousness Level
Small batches	Production for customer orders.	Unique parts.	Autonomous	Level Green (post-modern)
	Production one by one.	Units technically complex.	Autonomous	Level Green (post-modern).
	Production in stages.	Large equipments.	Autonomous	Level Green (post-modern).
	Production in small batches.	Moderated complexity.	Semi-Autonomous	Level Orange (modern).
Big batches	Production in big batches, mounted later.	Units mounted later.	Non-autonomous.	Level Red (traditional).
	Production of large batches type assembly line.	Assembly line.	Non-autonomous.	Level Red (traditional).
	Mass production.	Low complexity.	Non-autonomous.	Level Red (traditional).
Continuous process	Continuous process production combined with packaging in large batches or mass production.	Moderated complexity.	Non-autonomous.	Level Red (traditional).
	Continuous process production of chemicals in batches.		Enriched teams.	Level Blue (traditional).
	Flow-through production of liquids, gases and solid forms.		Enriched teams.	Level Blue (traditional).

Source: The Authors (2016).

2 RESEARCH DESIGN

A literature review made by Bastos & Cordeiro (2016) found a gap regarding the relations between team members's consciousness levels, teams' autonomy and knowledge management effective on the shop floor, and then proposed new studies to establish these relations. This current research aims to develop and implement an expert's panel in order to analyze these relations. Taking into account the insights from the new literature review that was performed and also from some alrealdy accepted results relating technology complexity and teams' autonomy, three new variables wer added to the orinal model, with the aim of allowing them to be tested together with consciounsness levels, teams autonomy and knowledge management. These variables were: i) Leadership styles and b) process technological complexity and c) product complexity and innovation. With these additions, the proposed model to be tested is presented in Figure 3.

Figure 3 – Proposed model on the realtions of leadership styles, Teams' autonomy, team's awareness levelsand product and process technical complexity and team's effectiveness.



Source: The authors (2017).

The most common of qualitative forecasting methods is the Delphi Method (WHEELWRIGHT & MAKRIDAKIS, 1980; BRADLEY & STEWART, 2003) which was chosen by the authors due to its reliability.

The Delphi technique is a method that proposes the deduction and refinement of opinions of a group of experts of a certain subject, whose intention is to find the common sense of the opinions of these specialists through questionnaires and feedback (LINSTONE, et. al, 1975; SCARPARO, et. al, 2012). This technique is based on the structured use of knowledge, starting from the assumption that the collective judgment (if organized) is better than the individual opinion. The achievement of a consensus through the application of the questionnaire represents the consolidation of opinions, converging in a model (if applicable) (MAKITALO, et. al, 2010; LAAKSO, et. al, 2012).

According to De Queiroz Pinheiro et. al, (2013), a panel of experts can be used within a research at two different moments:

I) As part of a preliminary phase, in which it contributes for the establishment of bases for the research;

II) As part of the data collection itself, either as a single research strategy or combined with others ().

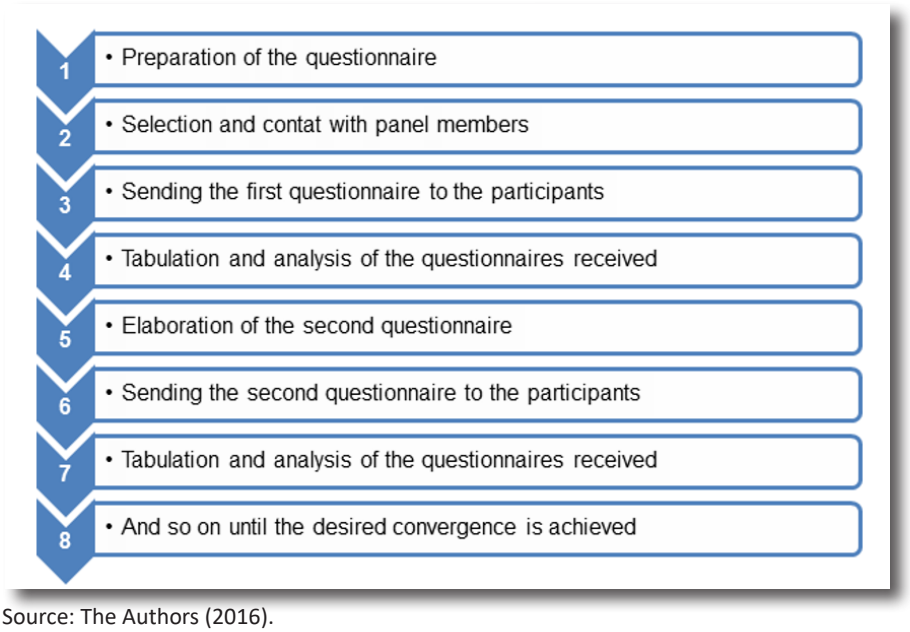
An integral part of this initial phase is the exploration, when the literature must be reviewed, and also exploratory interviews can be carried out with experts (DE QUEIROZ, et. al, 2013).

The realization of a panel of experts allows the interaction between the different knowledge involved, due to the distinguished experience of the selected professionals. The experts can also be called when a new search theme is being established, and when there is no previous information on the subject (STRUCHINER, et. al, 1998; DE QUEIROZ, et. al, 2013; MAKITALO, et. al, 2010; LAAKSO, el. al, 2012).

The use of more than one technique of data collection and analysis, within a single research project, is growing. This is because it is already understandable that the same study could contemplate different approaches and themes, and that it involves strategies of research (qualitative, quantitative, exploratory, etc) (DE QUEIROZ, et. al, 2013).

To comprehend the Delphi Method clearly, a flowchart was created by the authors as follows.

Exhibit 7 - Steps of Delphi Methodology



Source: The Authors (2016).

In questionnaires related to the Delphi technique, different types of questions can be used (structured, open, scaled, true or false, etc.). For this, it is important to identify the information that the authors want to obtain, and also do not influence or to direct responses (SCARPARO, et. al, 2012).

According to Hasson and Keeney (2011) in their Delphi study there are at least 10 different types of Delphi design. Hasson and Keeney (2011) also propose three or more rounds to validate the analysis, since the first round must be open qualitative (FLYNN, 1990; KUUZI, 1990; SCARPARO, et. al, 2012), the second round must be formulated on the basis of the answers of the first round (MAKITALO, el. al, 2010), and so on, until reach the seeking convergence.

After structuring the questionnaire, prior to the beginning of the panel, it is recommended that the questionnaire be sent to people who have experience or training in the area to do a validation of the content. This pre-test might be used with participants who are not part of the selected experts, only for diagnostic criteria of possible problems and gaps that may occur, and may correct them before the first stage of the panel (FLYNN, 1990; SCARPARO, et. al, 2012).

As the participation of the specialists is of great importance, the professional qualification in the area treated in the study is extremely relevant, in order to obtain a specialized consensus (KUUZI, 1999; FLYNN, 1990). The panelists selected need to be from the field of study in question, enabling to cover all aspects related to the subject studied. Experts respond, in this case, writing to a series of questions (Appendix A and B).

It is not predefined in the Delphi method, a number of participants for the panel (considering that success is related to the quality of participants). When defining the level of qualification for the selection of specialists who participate in the panel, it is important to be aware of the level of abstinence reported in the literature (30% to 50% in the first round, 20% to 30% in the second round) (KUUZI, 1999; SCARPARO, et. al, 2012; DE QUEIROZ, et. al, 2013).

After the responses, those answers are distributed to all members of the panel in order for them to revise their answers in subsequent rounds (FLYNN, 1990). The anonymity of the experts helps avoiding expressions and listening to one another, or also because the different position or status of each one, that could affect emotionally any panelist and influences their responses (LAAKSO, et. al, 2012).

Surveys' designs with questionnaire are the most commonly approach in empirical researches (FLYNN, 1990). An approach suggested by Flynn (1990) is mail survey, sending the questionnaires to a selected sample. It is important to be careful with the response rate, seeking a good reliability to the research (perhaps 50% of response range).

Hasson and Keeney (2010) present in their study three different manners to define the reliability of a questionnaire, two of which will be used in this research:

1. Inter-observer measure: This method compares the answers from experts on, considering the level of agreement between the panelists;
2. Parallel-form measure: This method consists on changing the order of the questions or modifying the words of the questions (but keeping the same meaning). If the experts' answers are the same for both rounds, it indicates a positive correlation and a good reliability (at least 80%), it aims to define any errors in the questionnaire construction.

In this research, the authors chose the snowball technique to form the experts panel, which is nothing more than the definition of the panel of experts through the indication of people who have experience in the subject to be searched (SCARPARO, et. al, 2012). In this case, a first specialist (after identified) is asked to indicate other participants, also experts in the theme, and so on until the desired number of participants is obtained.

Initially, the authors developed the first questionnaire and selected 10 experts to the pilot testing round. This testing round is an important part of questionnaire construction (FLYNN 1990) and was used to validate the questionnaire to be used in the expert's panel, avoiding misunderstandings and also clarifying concepts.

After the testing round, the authors chose the Classical Delphi method, aiming to elicit opinion and gain consensus (HASSON AND KEENEY, 2011). Aiming at a broader questionnaire, different kind of questions were developed by the authors, according to Flynn's (1990) definitions:

- Multiple choice items;
- Ordinal scale;
- Comparative scale;

Both, first and second round used the parallel-form measure and inter-observer measure which compares the answers from the experts to achieve a correlation in their answers.

The first round of the questionnaire was sent for each specialist individually by e-mail, considering that the experts had no contact with each other, to avoid a combination of responses. In the first round, 60% of experts answered the questionnaire, generating a consensus on the questions 1, 2, 4, 6, 7, 8.

After the analysis of the first round of the questionnaire, the authors remodelated the questions that did not obtained convergence of opinions (3, 5, 9, 10 and 11),

keeping the same meaning but changing the format and the type of those questions, formulating eight new questions.

3 FINDINGS

This study validated the relationship between team members' consciousness levels, teams' autonomy and knowledge management on the shop floor. Through Delhpi method, was possible to establish these relations and include leadership styles, together with teams' autonomy, as variable that affects the effectiveness of the knowledge creation processes on the shop floor.

This paper structured a model based on specialists' viewpoint on the related areas, and validated the consciousness levels: red & blue (considered as traditional values), orange (considered as modern values) and green (considered as post-modern values), relating these values with teams' autonomy level (non-autonomous teams, autonomous, semi-autonomous or enriched teams).

As a conclusion from the first round of the method, the experts argued that each person is unique and has a repertoire of values different from others and that it is part of the functions of leadership to identify the inclinations and interests of team members. They also conclude that from this identification it becomes possible to develop and exploit the potentialities of people. They argued that there must be a clear relationship between the problem and the solution perceived by the team members, in the sense that this work will bring benefits in the daily lives of these workers. In this sense, communication between leadership and team must be constant, aiming at bringing together leadership and team, which will give the leadership the understanding and knowledge necessary to "lead" the team in the direction desired by the organization.

They also defended the idea that the effectiveness of a particular type of leadership can be affected by team members profiles (according to the values of each individual). Considering that each team member has different values, knowledge and skills, a flexible leadership style adapted to each team member, rather than a single (autocratic or democratic) leadership style for the team as a whole would be more appropriate according to the specialists.

It was identified that people with values considered more "traditional" need a more autocratic leadership profile, that is, they work better with less autonomy. To maximize results for a team with such a profile, the experts considered that the team is drawn in a non-autonomous format, which typically performs repetitive tasks. The

level of innovation is low, and the focus of the team is to follow the rules pre-established by top management.

Sustainability, teamwork and interdependence, are increasingly common themes in business cultures. Companies focused on these concepts seek to form high performance teams by hiring people with values considered "post-modern", such as: empathy, sense of justice and ecological concern. In order to obtain a high performance team, where there is predominance of 'post-modern' values, the design considered ideal by the specialists is that of an autonomous team.

The answers of the experts converged on the choice of the autonomous team design as being more appropriate for a company that constantly presents the innovation and the development of new products. They mentioned values such as: Open mind, Creativity, Interpersonal Communication, Respect for Differences, Flexibility and Confidence.

In industries considered to be of low innovation, of both product and process, experts considered that enriched teams are the best choice and more likely to achieve higher performance.

Experts converged opinions on the existence of a difference in team's design for a company that manufactures products with greater complexity compared to a company that manufactures products with less complexity. Regarding the best type of design for each case, the answers converged as only the autonomous team was the most appropriate for companies with more complex activities and the other teams as being more suitable for companies with less complex activities.

Regarding the main values that the members of Autonomous Teams (Great Complexity) should have, the most quoted were: Authenticity, Trust, Self-targeting, Focus, Flexibility, Systemic Vision and Communication. By another side, Semiautonomous Teams (Minor complexity) were identified with the following values: Diversity, Informality, Participation, Communication, Group integration and Focus on the result. Regarding Leadership Styles and their relation with team members level os consciousness and also in regard to the relation between consciousness levels and the most effective group design, no consensus were reached during the round one, what lead the authors to, based upon the already consensued issues, design a more objective questionnaire for the second round.

The Question number 1 of the second round reached 66,6% of convergence, affirming that the higher the complexity of a consciousness level and its values, the more effective democratic and strategic leadership styles would be. The second question, with 88,8% of convergence in opinions, allowed the experts to agree that the higher the complexity of a consciousness level and its values, the more effective are the work teams with higher autonomy.

The specialists also reached a signficative convergence on Question 3 (55,5%), stating that the higher the complexity of a product, the more effective are the work teams of higher autonomy.

No conclusion was reached on the relation of work teams' autonomy and their suitability for different productive processes technologies, contradicting the classic Woodward's study of the 1950's. Nevertheless, this part of the second round questionnaire wasn't directly related to the original model, and was included in order to make a broader connection between the variables that impact the effectiveness of different levels of autonomy and different leadership styles.

The questions 5 to 8 were focused on how to measure the performance of the teamworking on the shop floor in terms of knowledge management, considering teams with different values: egocentric, traditional, modern and post-modern. It was possible to conclude that the lower the levels of consciousness, the higher the importance given to measure knowledge management effectiveness in terms of operational indicators. For example, the number of Kaizen projects implemented by operators were pointed as the most important indicator for an egocentric level of consciousness within a team on the shop floor. Accordingly, the less important indicator for this level os consciousness was "Percentage of operator engagement (organizational climate)".

For teams with the predominance of traditional values, the most important indicator presented was "Percentage of line utilization or productivity" and the less important was "Percentage of improvement's suggestions made by operators, implemented". This result denotes that in a team with the tradional profiles, "organizational" indicators are more important than "human resources" indicators, reflecting the old Taylorist/Fordist approach for organizing.

According to the opinion of the panelists, both modern and post-modern teams give more importance to indicators such as "Customer satisfaction", "Financial results obtained with improvements from projects carried out by operators" and "Percentage of operator engagement (organizational climate)". These results validate the conclusion that the higher the level of consciousness, the higher is the importance given to more strategic ans also "human values" indicators.

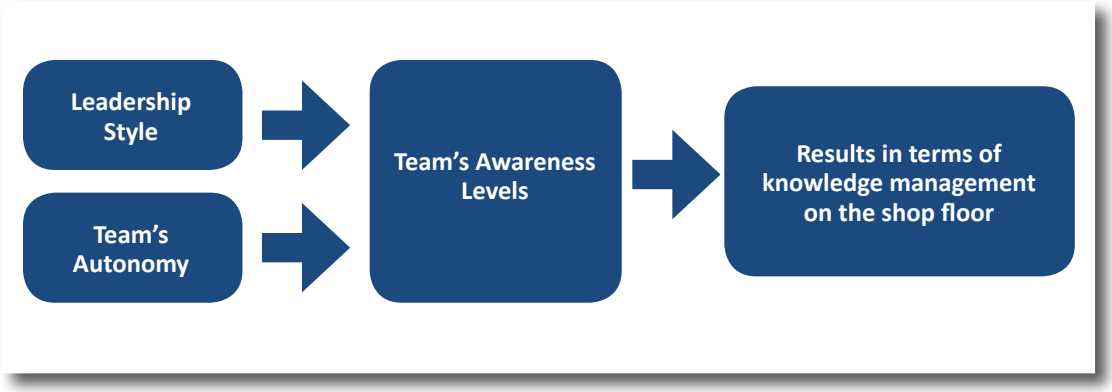
All the above mentioned results enabled the validation of the core of the proposed model, that states that democratic leadership and more autonomous work teams design do not implicate straightly in better results in terms of knowledge management on the shop floor, like many authors of the field seem to suggest and is depicted in Figure 4. Ccording to these authors, more democratic and strategic profiles of leadership and more autonomous working teams are more likely to produce better results in terms of teams' effectiveness, regardless any characteristics of the team members.

Figure 4 – Leadership styles, teams' autonomy and their correlation according to most of the previous research in the area, as showed by BASTOS and CORDEIRO (2016).

Source: The Authors (2016).

Instead, the effectiveness of both the leadership styles and the teams' autonomy level on the knowledge management on the shop floor depends mostly on team members' level os consciousness and values (like depicted in Figure 5).

Figure 5 – The validated model proposed by authors. Leadership styles, teams' autonomy and team's awareness and their correlation with performance measured in terms of knowledge management on the shop floor, according to the research results.



Source: The Authors (2016).

CONCLUSION

The former research conducted by Bastos & Cordeiro (2016), a systematic literature review, found a gap regarding the relations between team members' consciousness levels, teams' autonomy and knowledge management on the shop floor. This study aims to establish these relations and include leadership styles, together with teams' autonomy, as variable that affects the effectiveness of the knowledge creation processes on the shop floor.

Based on the former worker of Bastos & Cordeiro (2016), a theoretical-conceptual model (construct) was proposed, aiming to relate the following variables: teams' leadership profile, teams' autonomy, team members' consciousness levels and teams' effectiveness in terms of knowledge management. Mainly, this paper sought to validate the proposed model with specialists on the related areas.

To achieve these objectives, the authors used the Delphi method. This method proposes the deduction and refinement of opinions of a group of experts of a certain subject, whose intention is to find the common sense of the opinions of these specialists through questionnaires and feedback (LINSTONE, et. al, 1975; SCARPARO, et. al, 2012).

Initially the preparation of the questionnaire was carefully done, being tested with five professionals on the related areas answering and analizing it. After that, ten specialists on the field were selected for the research itself. Two rounds of questionnaires were necessary to achieve convergence in opinions of those specialists in all the proposed questions.

The experts defended the idea that the effectiveness of a particular type of leadership is strongly affected by team members' values. According to them, considering that each team member has different values, knowledge and skills, a flexible leadership style adapted to each team member, rather than a single (autocratic or democratic) leadership style for the team as a whole would be more appropriate.

It was also identified that people with values considered more "traditional" need a more autocratic leadership profile and also to work in less autonomous teams. The level of innovation is low, and the focus of the team is to follow the rules pre-established by top management.

In order to obtain a high performance team, where there is predominance of 'post-modern' values, the design considered ideal by the specialists is that of an autonomous team. The answers of the experts converged on the choice of the autonomous team design as being more appropriate for a company that constantly presents the innovation and the development of new products.

Experts converged opinions on the existence of a difference in team's design for a company that manufactures products with greater complexity compared to a company that manufactures products with less complexity. Autonomous team was the most appropriate for companies with more complex activities and the other teams as being more suitable for companies with less complex activities.

The experts agreed that the higher the complexity of a consciousness level and its values, the more effective are the work teams with higher autonomy. They also agreed that the higher the complexity of the products being manufactured, the more effective are the work teams of higher autonomy.

On the second round of the questionnaire, the questions 5 to 8, defined the best indicators to measure the performance of the teamworking on the shop floor in terms of knowledge management, considering teams with values: egocentric, traditional, modern and post-modern.

It was possible to conclude that the lower the levels of consciousness, the higher is the importance given to an indicator of operational matter. Also, in a team with main values considered traditional, organizational indicators are more important than "human resources" indicators, reminding the old Taylorism/Fordism method of production system.

To teams with modern and post-modern values, the experts gave more importance to more strategic indicators such as:

- Customer satisfaction;
- Financial result obtained with improvements from projects carried out by operators;
- Percentage of operators engagement (organizational climate).

With the conclusions showed above and the validation of the proposed model by the specialists, the authors suggest the implementation of a quantitative survey on companies with different profiles in order to aplly the defined model on actual shop floor teams, in order to test its effectiveness on predicting how effective such a team can be depending on the leadership.

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