

## **Innovation Management Culture in the Brazilian Energy Sector: A Competing Values Framework Analysis**

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**Abstract:** The Competing Values Framework (CVF) has been used in many organizations around the world in order to understand innovation management culture. A study was made by the Fundacao Dom Cabral's innovation management center (FDC) with the objective of validating the CVF methodology in the Brazilian energy sector. We used qualitative analysis to examine the CVF according to four quadrants: radical innovation, market driven innovation, control and continuous improvement and innovation culture. Data from 248 executives were used in this analysis. The results have shown that control and continuous improvement prevailed over the radical innovation and market driven innovation subscales. Our conclusion suggests that CVF is an important methodology for assessing psychometric properties, observing the challenges inside Brazilian organizations and their behavior.

**Key words:** Competing values framework, culture of innovation, market driven innovation, radical innovation, control improvement, energy sector

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### **INTRODUCTION**

An innovation management culture comprises the fundamental values, assumptions and beliefs held in common by executives of an organization. It is stable, socially constructed and subconscious. CEOs and directors affect positively organizational innovation management and greatly influence how employees relate to one another and their work environment. In fact, organizational culture is among the most critical barriers to leveraging new knowledge and implementing technical innovation.

Organization researchers have frequently used Competing Values Framework (CVF) to assess organizational culture and its association with innovation management processes and outcomes. As a result, researchers such as Cameron and Freeman (1991) have credited (or faulted) organizational culture with contributing to significant differences in quality, efficiency, effectiveness of provider teams, productivity and total quality management in organizational performance.

Although, instruments based on the CVF are frequently used in Brazilian organizations to assess

culture innovation, there has been limited validation of CVF instruments when applied to executives, employees and other members of energy sector organizations. Studies published by Quinn and Rohrbaugh (1981, 1983), Quinn and Spreitzer (1991), Goodman *et al.* (2001) have contributed to the understanding and validation of CVF as a reliable organizational culture instrument.

The objective of the present study is to test the CVF's properties as an instrument for analysing Brazilian management innovation culture in the energy sector of a large sample of 248 executives. We chose to focus on managers because the CVF instrument is general and has not been previously validated among managers in the energy sector.

Theoretical and methodological background for the research for the implementation of this study are considered in the following publications.

### **MATERIALS AND METHODS**

In the early 1980s, the CVF methodology was developed as a conceptual framework to integrate ideas of innovation and concepts of culture, Quinn and

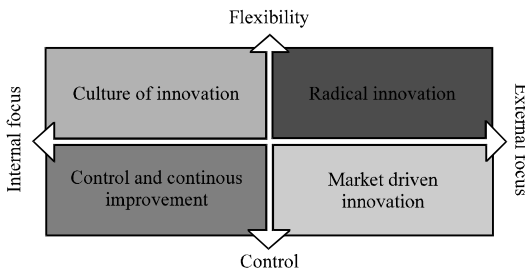


Fig. 1: The competing values framework of innovation processes. Adapted from Quinn and Rohrbaugh (1981)

Rohrbaugh (1981). The framework is a synthesis of organizational theories based on two dimensions: the competing values is the degree to which an organization emphasizes centralization and control over organizational processes versus decentralization and flexibility and competing values is the degree to which the organization is oriented towards its own internal environment and processes versus the external environment and relationships with outside entities.

Classifying organizations using these two dimensions results in four archetypes: radical innovation, market driven innovation, control and continuous improvement and innovation culture (Fig. 1).

In the CVF, organizations with an internal focus and emphasis on control, labeled hierarchical cultures, adopt control, continuous improvement and productivity processes. Organizations with an internal focus and emphasis on flexibility, focus on a culture of innovation, encourage participation by employees, teamwork and empowerment. Organizations with a focus on the external market with flexibility in their decisions, creativity in management and the capacity to generate ideas, suggest a market-focused profile directed towards innovation and even radical innovation. Finally, organizations with an external focus and an emphasis on market driven innovation are characterized by clarity of tasks and goals. They place a premium on efficiency and measurable outcomes (Denison and Spreitzer, 1991).

These four innovation management cultures are proposed as archetypes. In reality, organizations are expected to reflect all four cultures to some degree. The CVF does not specify a preferred innovation management culture and there are many hypotheses about which cultures or combinations of cultures would be the best for the energy sector (Luk and layton, 2002). However, a fundamental supposition of the CVF is that all four innovation management cultures operate at an organizational level and remain relatively stable over time

(Ostrff *et al.*, 2003). Furthermore, all four innovation management cultures are hypothesized to permeate organizations, from the comportment of managers, to the values that bind employees to one another, to the priorities the organization pursues.

The CVF survey instrument used by the fundacao dom Cabral's innovation management center researches comprises 16 items divided into four subscales, each representing one of the four archetypal innovation management cultures and it was tested in the Brazilian energy sector.

The original 16 item instrument was first validated by Quinn and Rohrbaugh (1981) by means of a multi-dimensional scaling using survey data from executives of public utilities. The researchers used two versions of the instrument, one with ipsative scales and one with Likert scales (Baron, 1996). The ipsative scales required respondents to allocate 100 points among four survey items according to how well each item described the organization relative to the other items with each representing one of the four cultures. The Likert scales required respondents to allocate between one and five points per item, independently of how they scored other items. Item wording varied between the two instruments. Quinn and Rohrbaugh (1981) found that data from both versions of the instrument conformed to the CVF and items among the four subscales correlated, by and large, as predicted in the model. They concluded that the CVF had good construct validity and that the instruments were reliable (Kalliath *et al.*, 1999).

The present study is a piece of qualitative research, Zammuto and Krakower (1991), comprising a review of the specialized literature, carried out between July and October of 2015 in which international periodicals were consulted such as *Enterprise and Innovation*, *European Journal of Innovation Management*, *Innovation and Development*, *International Journal of Entrepreneurship and Innovation Management*, *International Journal of Innovation and Sustainable Development*, *International Journal of Innovation Management*, *Journal of Technology Management and Innovation* and *The Journal of Product Innovation Management*, in accordance with Fig. 2. The examination of these periodicals attests to the search for up-to-date research, future tendencies and aspects related to its applicability to the energy sector.

Following this, we sought to study and understand the principal parameters and form of application employed, found in the studies on competing values framework, culture innovation and the energy sector. This study thus has the following starting points:

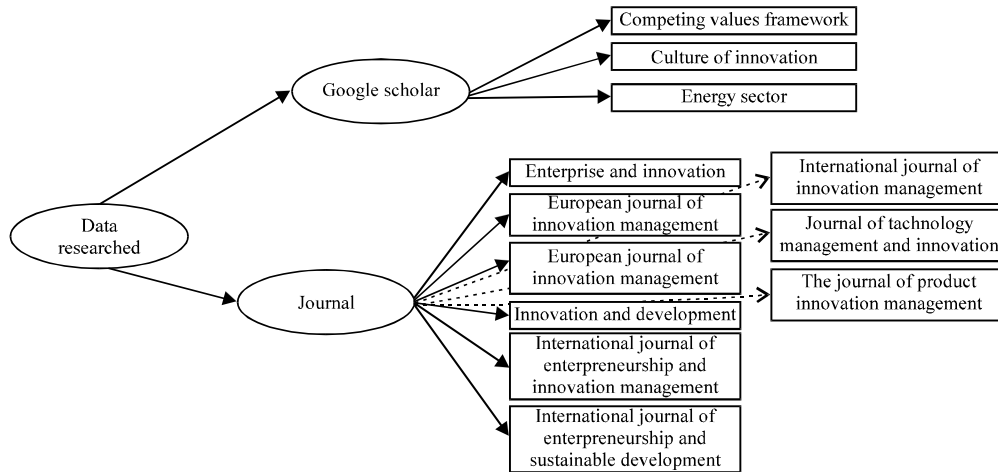


Fig. 2: Review of the literature; researchers

- The Competing Values Framework (CVF) has been used in various organizations worldwide. A review of the literature, nevertheless, suggests that the energy sector does not present any corresponding studies
- The culture of innovation is not a theme studied in depth in the energy sector, especially by means of the CVF
- The results suggested by CVF can represent suggestions for improvements to the innovation management and a new innovation culture for the energy sector

**Data:** An innovation management survey was distributed to 248 executives from the Brazilian energy sector. The executives varied from oil and gas, mining, electricity services, technology management and government sectors. The survey was conducted by the Fundacao Dom Cabral's innovation management center between July and October of 2015 and the responses were voluntary and anonymous. The overall response rate was 89%. Executives had the option of completing surveys online or by E-mail. A total of 248 surveys were returned to be analysed.

**The instrument:** The innovation management survey was fielded by Fundacao Dom Cabral (FDC) in 2015 for innovation management purposes. It included 14 innovation management items adapted from Quinn and Rohrbaugh (1981). The Innovation Management Survey instrument was, itself, an adaptation of the CVF scales (Fig. 1). The latter consisted of 14 items, measuring the four innovation management archetypes over four organizational domains or dimensions. Respondents scored each item on a 100 point ipsative scale according

to how well each item described the organization relative to the other items with each representing one of the four cultures. To analyze the results, a software developed by FDC was used to analyze the survey results.

**Analyses:** The CVF analyses assess the properties of the culture subscales. Subscale reliability, convergent or divergent properties are defined as the extent to which item responses correlate highly within the same subscale and fail to correlate highly with items from across subscales as predicted by the CVF. We used one set of measures and we analyzed the convergent or divergent properties of the items by assessing the results of the subscales.

## RESULTS AND DISCUSSION

The research results on the Brazilian energy sector are presented in Fig. 3. The results suggests that the first the response concentration are presented on the aspects related to the internal environment and control rather than the questions related to the external environment and flexibility In accordance with Quinn and Rohrbaugh (1981), organizations with this profile are characterized with structures which are hierarchical and controlling and not open to the practices of innovation management. In this case, business structures are orientated to production and cost control. In terms of organizations' internal management environment the results suggests that the working environment would not be amenable. That is the executives are being guided by the established guidelines from the top directors (high hierarchy) reflecting on little liberty to indulge new ideas. Therefore, the organization would need a large amount of work from the human

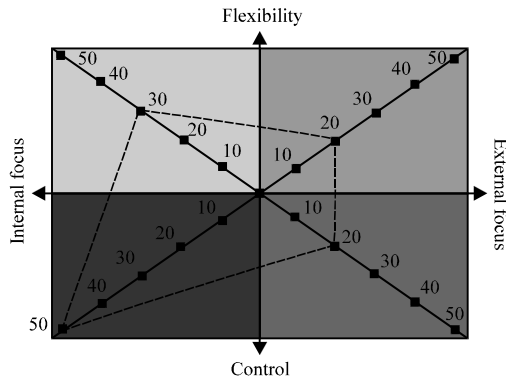


Fig. 3: The competing values framework of the Brazilian energy sector; researchers

resources team, seeking new values, cohesion, trust, support for the staff and market-focused business practice.

The CVF's second response concentration suggests that the Brazilian energy sector is focused on internal practices, seeking to satisfy market demand. Organizations with this type of behavior are usually stable in their internal relations, prioritizing bureaucracy, rules and business structures, rather than market demands. Thus, in this case there, there is a need for an intensive culture change efforts seeking new business solutions and a pro-market culture.

With less emphasis, the perception regarding flexibility and external focus are reinforcing the previous results that is the perception that the Brazilian energy sector has focused its actions on the internal working environment, rules, processes, costs and control of business practices.

The results of the research with 248 executives from the Brazilian energy sector suggest that the characteristics related to innovation practices are focused on questions associated with control and productivity, rather than on aspects such as radical innovation, market-oriented innovation or on a new innovation culture, in accordance with Fig. 3. It is important to stress that the CVF reflects the perception of the innovation practices of the organizations today. The process of change is fundamental, the human resources team important, in stimulating a new culture and values in favour of innovation.

**CONCLUSION**

The competing values framework has been the most widely used model to assess Innovation management

culture. It has been offered as an explanation for the Brazilian energy sector with differences in implementation of innovation processes. CVF instruments are generally presented as well-validated with reliable, generalizable subscale solutions. They have been frequently fielded among managers under the assumption that the results provide an accurate gauge of culture as experienced by the broader organization. Our findings suggest that the Brazilian energy sector emphasizes control and flexibility over radical innovation and market driven innovation. Overall, this study strikes a note of caution in inferences based on aggregated CVF scales when applied to small populations. Our findings suggest challenges in the management in assessing innovation management culture in the Brazilian energy sector in the context in which the CVF are used.

**RECOMMENDATIONS**

We also describe that the Brazilian energy sector emphasizes control and flexibility over radical innovation and market-driven innovation. However, our study is not the final word on the CVF, nor is it a sufficient basis to conclude our findings. Significant additional research is needed. Finally, additional research is needed with more executives with a different population associating the theoretical model with other processes and outcomes in order to establish the validity of the CVF.

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