

Development of a systems approach to assess organisational adequateness

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Abstract

This paper proposed a systems view to address a research design aiming at discussing the adequateness of the organisational structure of a firm along time. The approach was closely related to the complex nature of the situation and it would focus on the contribution of the design parameter IS/IT to the formalisation of the firm structure. Actually, Enterprise Systems might provide a significant impact in decision making, either by contributing to enhance control, or to information transparency, because structure effectiveness depends on the internal coherence between the design parameters and the contingency factors. So, relevant information systems should contribute to the alignment and coordination of organisational activities, to the creation of relationships among businesses, to the systematic search of business opportunities. This proposal set a few research questions, about the definition of an adequate conceptual model to discuss the problem-situation, about the role of information systems within the structure, about the usefulness of enterprise systems best practice and, about its acceptance by the public limited companies of Mozambique. In fact, the practical grounds for the exercise concerned the path pursued by a State-Owned Enterprise from Mozambique since the independence of the country in 1975 by checking which structure changes have occurred with PETROMOC. The conceptual model would, then, be used as a way to reconstruct a sequence of Past events providing a base for longitudinal ordered questioning and so, searching paths to explain and discuss the future. Thus, PETROMOC will provide a base to empirically test the usefulness of the conceptual model. To sum up, the Soft Systems Methodology was proposed as the way to operationalise the systems view in a useful method that might provide original, relevant, updated and unusual contributions to the design of enquiries concerning complex organisational situations. This might become a step further, to test and develop the mid range theory proposed by Vilas-Boas (2009b), in order to find adequate organisational structures to strategic business development.

Keywords: Holistic change, complex organisational design, information systems role, systems approach, Soft Systems Methodology, state owned firm

Introduction

Theoretical background

Globalisation and strong competitiveness are key aspects of the real world with which organisations have to cope, nowadays. The organisation structure is a key enabler of business operations, which, in turn, is a determinant of business performance. Neely (1999) had already identified the determinants of business performance as a fundamental question to be addressed.

In fact, the choice of the organisational structure may contribute to building up competitive advantage through the grouping of activities into organisational units, in such a way that utilisation improves (Mintzberg, 1983). These units are differentiated from each other and so, individualised, which creates a need for lateral coordination. Management Information Systems are a natural candidate to this role.

Michael Porter (1989) also suggests that a firm should define and adjust its units to the sources of competitive advantage and so, it should set the right coordination options by positioning its structure within the value chain context. This introduces the discussion about both organisational processes and inter-organisational relationships among suppliers and distributors grouped within a network of common interest.

This scenario summarises a few key contributions that provide room to argue in favour of the increasing role of the information systems within the organisational design. According to Silva (2002: 424), Enterprise Systems (ES) are large-scale, enterprise-wide and they emphasise systems not business integration. They help to break through the functional silos and they enable the integration of transactions-oriented data and business processes throughout an organisation. They also support companies operating multi-sites, global sourcing, international distribution and different metrics for measuring performance.

Moreover, a preliminary literature review has showed that structure effectiveness depends on the internal coherence between the design parameters and the contingency factors, that is the configuration hypothesis (Rodrigues *et al*, 1995). On the other hand, the information systems and their technical *soutien*, the information technologies, are one of the design parameters of the structure. In fact, they contribute to the alignment and coordination of organisational activities, to the creation of relationships among businesses, to the systematic search of business opportunities (*e.g.* Hammer and Champy, 1993; Laudon and Laudon, 2004, 2000; Porter and Millar, 1985)

System Dynamics: from Theory to Practice

This paper proposes a systems view to address a research design aiming at discussing the adequateness of the organisational structure of a firm along time. The approach is closely related to the complex nature of the situation and it will focus on the contribution of the design parameter IS/IT¹ to the formalisation of the firm structure. Just to illustrate the relevance of the subject, one could think that Enterprise Systems provide a significant impact in decision making, either by contributing to its centralisation by increased control, or to the decentralisation of the process through information democratisation.

The practical grounds for the exercise concern the path pursued by a State-Owned Enterprise (SOE) from Mozambique since the independence of the country in 1975.

¹ IS/IT – Popular acronym for designating *Information Systems/Information Technology*

This company survived and had to adapt its structure to external environments as different as the centrally planned or the market economies

The growing curiosity and concerns about the case were initially expressed by means of the following research questions:

1. How to develop and validate a conceptual model to discuss and orientate organisational development across time?
2. Which lateral liaison mechanisms are affected in a significant way by the ES implementation, during the organisational development within a specific context?
 - a. What is the role performed by the planning and control procedures and by their related computer applications?
 - b. Are there alternative or complementary mechanisms? What are the existing relationships? What is the impact of the formal control procedures in these mechanisms?
3. How does the strategic planning of information systems relate to the organisational development?
4. How can the needs of the firms of Mozambique cope with the technological and organisational ability of the information systems that represent the ES best practice?
5. Will the relevant choices about the information systems and their implementations be feasible and culturally acceptable by the firms of Mozambique?

By looking at these research questions, it is argued that the chosen real world situation provides a case with high standards of ecological validity, in order to address the impact of the external environment progress along time in the firm structure and, also, in its behaviour and performance.

Moreover, the systemic process chosen to address the research questions will follow the rules accepted by the scientific community under the heading of Soft Systems Methodology (Checkland, 1994). This should result into a holistic, contingency, strategic, pluralistic, unbiased, reliable, complete, structured and non-deterministic view that is rival of the hard systems one. The latter is characterised by mechanistic, reductionist and functionalist approaches of very close scopes that, many times, can be more distorting than illuminating, under certain circumstances (Patton, 1987: 158). To sum up, the unit of analysis is the firm, despite the focus being on the information systems.

The expected results of the proposed research design concern the development of a validated audit tool that should show up usefulness enough to discuss the adequateness of the firm structure to a specific context, by focussing on the information systems that implement the planning and control design parameter.

Next section will present the research design introducing, explaining and justifying the methodological choices. This will specify the proposed systems approach to address the research questions. The last section of the paper are the conclusions.

Proposal of research design

The research design will follow the Soft Systems Methodology (SSM). This is a systems methodology that approaches the improvement of the problem-situation under a structured and holistic way (Checkland and Poulter, 2006). In addition, SSM generates an emergent, negotiable and adaptive design that takes into consideration a multiple

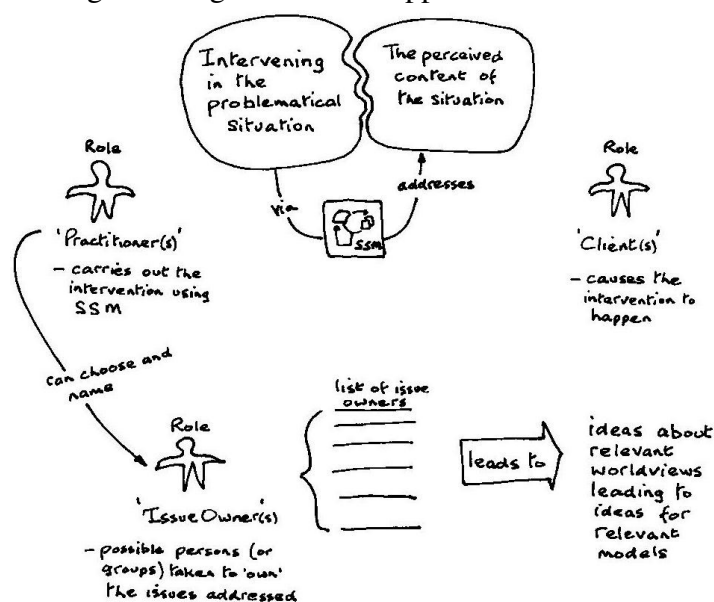
reality manifold by promoting a method of enquiry that adapts to changes in problem situation (Vilas-Boas, 2009a).

On the other hand, the qualitative case study is a research strategy that follows a holistic view that is context sensitive, enabling an in depth study that promotes cross-check and is capable of dealing with more variables than data points (Patton, 1987; Yin, 1994; Vilas Boas, 2009b). At last, an abductive approach will be pursued as a practical way to operationalise learning from the real world, through a constant interchange with the reality, during the case study development (Dubois and Gadde, 2002).

The nature of Soft Systems Methodology

This paper proposes a systems view to address a research design aiming at discussing the adequateness of the organisational structure of a firm along time. This SSM view is based on the following four cornerstones (Checkland and Poulter, 2006): phenomenology, singerian enquiry, real world research and hermeneutics. Jackson (1982) refers that the related subjective view that also belongs to this paradigm is based on both hermeneutics and phenomenology. The consequences for the research proposal is the possibility to search better ways to understand the reality by means of the experience of the people that is involved and interested in the system (organisation) to be studied within a specific context. In addition, the researcher view also contributes to the feeling of «being together with the things of the real world» (Jackson, 1996; Remenyi *et al*, 1998; Van Manen, 1990).

In fact, hermeneutics is integrative, it is concerned with the study of whole situations, it outlines the inextricable interconnectedness of social variables and, it includes both the observer and the organisation history (Tranfiled, 1983). The advantage of hermeneutics is that it seeks to add to the phenomenological view by identifying the structural and cultural contexts (Figure 1) which surround meaningful action (Tranfiled, 1983), *i.e.*, the frames of reference or traditions (Mingers, 1984). In this way, the findings coming out of the application of the audit tool in the industrial sponsor –



Source: Checkland and Poulter (2006: 29).

Figure 1 – SSM analysis

that concerns the organisation and the stakeholders identification until one reaches the characterization of the problem situation. So, some aspects that were not expected might

be brought in by this approach, *e.g.* some ethic principles due to *soft systems* orientation.

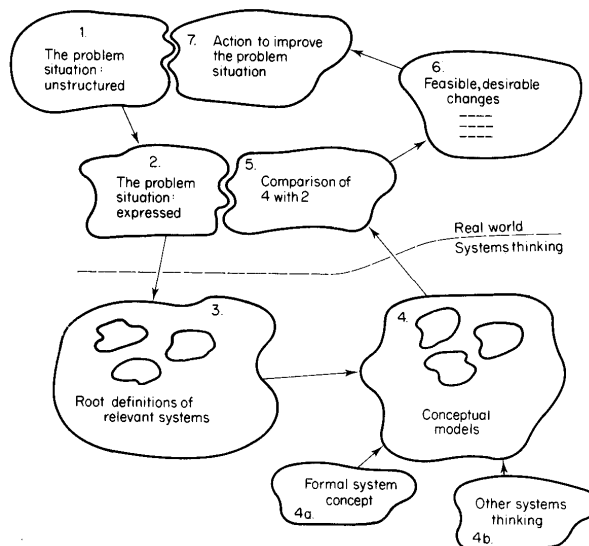
Moreover, the graphic expression of SSM also carries out an interpretative function and stresses explanation through developing understanding rather than through predictive testing (Symons and Walsham, 1988). For example, the use of pictorial figures, as in a drama representation (Figure 1), attempts to overcome the difficulties of communication with the participants and also the limitations of the SSM semantics. Another way to help participants is by quoting examples of other living experiences that are related to other organisations and/or societies.

Finally, the main attributes of the Singerian enquiry are, as follows (Jackson, 1982 in Silva, 2002: 154): (i) the analyst should accept completely different evaluations of the social reality; (ii) its subjectivist approach differed from the functionalist view; (iii) social problems were not adequate to technical solutions; (iv) there was room for argument and debate; (iv) social systems should serve their customers, *i.e.*, the stakeholders; (v) systemic assumptions should be confronted with plausible counter-assumptions; (vi) clients and decision makers could reach an ‘objective’ agreement concerning the systems goals by consensus; (vii) purpose should be developed in human society; and, (viii) the social world was not created by men in the full awareness of what they were doing. Thus, there is a learning dimension in the SSM evaluation that should promote discussion and opinion formulation amongst the PETROMOC stakeholders that might hold different interests and goals.

The application of Soft Systems Methodology

SSM is made up of seven stages (Figure 2), as follows: i) unstructured problem-situation; ii) expressed problem-situation; iii) root definitions of relevant systems; iv) conceptual models; v) comparison between the conceptual model and the expressed problem-situation; vi) assessment of both feasible and desirable change; vii) action to improve the problem-situation.

In the first stage – unstructured problem-situation – the problem-situation will be observed in order to collect several information about the organization structure,



Source: Checkland (1994:163).

Figure 2 – Seven stages of SSM

of the CATWOE dimensions, *i.e.* Customers, Actors, Transformation –

functional attributes, organisational culture, formal flows and channels, formal and informal decisions, activities, perceived problems, expected transformation, expectations, constraints, etc.

During the second stage – expressed problem-situation – the situation in which the problem occurs will be set. Such definition should be as detailed as possible regarding the problem definition, as follows: understanding of the way things work out, relationships between structure and processes, environment and culture, job description, among other aspects. Consequently, the relevant stakeholders that are involved should be identified enabling the definition

Weltanschauung, Owner and Environmental Constraint. This is the way to complete the definition of the problem.

In the third stage – root definitions of relevant systems – a descriptive framework will be conceptualised and graphically expressed, in order to resume the main issues considering the interest of all the stakeholders. This descriptive framework will be transformed into an analytical one as a result of a literature review orientated by the research questions. The analytical framework will include both graphical expression and propositions. All this development should match and/or accommodate the stakeholders (CATWOE) interest.

In the fourth stage –conceptual models – the model will be developed and theoretically validated in substages 4a and 4b. The development of the model is ‘an account of the activities which the system must do in order to be the system named in the definition’ (Checkland, 1994: 169). In stage 4a the analytical framework will be checked for consistency, completeness and lack of deficiencies against *grand* theories. In turn, in stage 4b the framework should be compared with other authors that the researchers outstanding admire (Checkland, 1994: 176). Despite formal systems cannot validate the conceptual models, they should enable to check that the conceptual model is not fundamentally deficient. The outcome of this stage is the audit tool.

In the fifth stage – comparison between the conceptual model and the expressed problem-situation – the audit tool will be applied to PETROMOC. Checkland (1994: 178) suggested four ways of doing the comparison of stage 5. In this investigation, the conceptual model will be used as a way to reconstruct a sequence of past events. Thus, the conceptual model should provide a base for longitudinal ordered questioning through the enquiring questions that will be defined. Thus, PETROMOC will provide a base to empirically test the usefulness of the conceptual model.

In the sixth stage – assessment of both feasible and desirable change – the proposed changes will be discussed as regards their desirability and cultural feasibility. After this exercise the firm should decide which changes are more convenient and, then, take action.

Research strategy

The chosen research strategy is the longitudinal case study. The sponsor is *PETROMOC, Petroleos de Mozambique*.

The main goal is to check which structure changes have occurred with PETROMOC, since it reached the status of Public Limited Company (plc), having previously been a fully State Owned Company. These changes should be related to the organizational context and they should focus on the information systems design parameter. Figure 3 shows how the company has progressed across time.

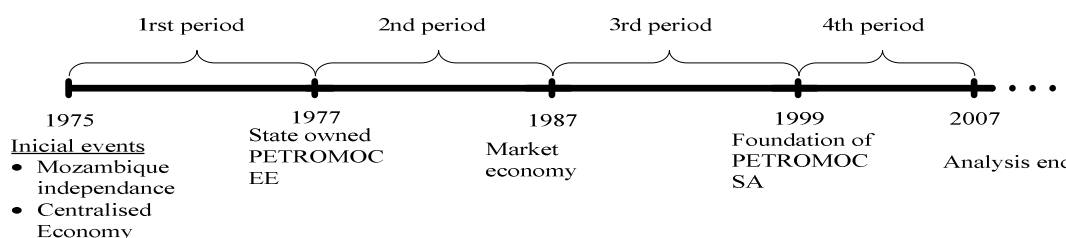


Figure 3 – PETROMOC progress across time

As depicted in the first period, Mozambique became an Independent State and so, a

Marxist-Leninist model was adopted. Later on, as a result of a nationalisation policy PETROMOC EE was created, in the second period¹. Meanwhile, the transition to the Market Economy finished with the previous political model. As a consequence in 1999, PETROMOC, SA a Public Limited Company was created. Thus, a new management model is required.

Data gathering strategy

The collection of primary data will make use of several techniques, namely semi-structured and unstructured interviews, participant observation and internal document/report reading.

Secondary data sources are, as follows: reports from government, associations and unions, magazines and journals, National Statistics Institute, Bank of Mozambique, market surveys, etc.

Triangulation of sources, informants and techniques will be used to improve the trustworthiness of the data (Jick, 1979; Yin, 1994; Eisenhardt, 1989).

Choice of sponsor and unit of analysis

The research will take place in PETROMOC. This case was picked because: i) PETROMOC progressed from a state owned company to a plc; ii) PETROMOC is representative of all the ex-state owned companies that became plc's; iii) it is a strategic company to the national economy of Mozambique; iv) it leads the fuel national market.

The unit of analysis is the business/organization. This means that the conclusions should report to this level. The organizational structure is a sub-unit and the information systems are the sub sub-unit.

Conclusions

The fundamentals of this work proposal are justified by the organisations need to react to relevant competitive challenges that include structure change over time. This paper summarised the general guidelines of a research proposal to discuss the adequateness of the organisational structure of PETROMOC, SA, along time, focusing on the role of its information systems. The target is about searching organisational designs for plc's that look adequate to the progress of the competitive environment of Mozambique.

Thus, a few research questions arose, about the definition of an adequate conceptual model to discuss the problem-situation, about the role of information systems within the structure, about the usefulness of enterprise systems best practice and, about its acceptance by the plc's of Mozambique.

Due to the complex nature of the situation, it was proposed a *systems approach* whose attributes were found, as follows: holistic, contingency, strategic, pluralistic, unbiased, reliable, complete, structured and non-deterministic. Thus, the Soft Systems Methodology was proposed as the way to operationalise the systems view that matches the problem-situation requirements.

The following contributions of the proposed research are expected:

- To the practitioner
 - Development of an audit tool that enables to discuss (i) the impact of the decisions concerning the information systems, as an organisational design parameter, as well as (ii) the resulting demand for organisational change;

¹ Published in *Boletim da República* no. 48, Série I, 1977

- To show the relationships and trade-offs between the information systems and other mechanisms that promote lateral linkages in a specific context;
- To theory
 - Designing or developing a conceptual model (*e.g.* Vilas-Boas, 2009b) which represents information systems typologies that show up as relevant to the problem-situation, through the operationalisation of an audit tool;
 - Comparing the audit tool with a sequence of Past events, searching paths to explain and discuss the future;
- To research
 - Operationalisation of SSM by means of the empirical test and theoretical validation of the conceptual model, which is a methodology recognised by the scientific community;
 - To be able to further discuss the adequateness of the organisational structure to a specific competitive environment.

Mainly, the limitations of the approach concern the validation of the conceptual model that should only identify models that are more defensible than others. In fact, Checkland (1994: 176) considered that formal systems cannot validate the conceptual models but they should enable to check that they are not fundamentally deficient with regard to: (i) inconsistency and/or inadequacies; (ii) the inclusion of the critical components whose absence or inefficiency is crucial to the existence of the perceived problem; (iii) completeness; and, (iv) usefulness when set against real-world activities (Silva, 2002: 171).

As further work, this research should also be replicated for other design parameters and in other case contexts.

At last, this problem approach showed up as different from mechanistic, reductionist and functionalist approaches, which are closer to pure best practice. So, this view is expected to contribute to a positive differentiation that might support the creation of competitive advantage.

As a final conclusion, it is argued that both the SSM choice and its operationalisation in a useful method might provide original, relevant, updated and unusual contributions to the design of enquiries concerning complex organisational situations. In fact, identifying relevant information systems, might become a step further, to test and develop the mid range theory proposed by Vilas-Boas (2009b), in order to find adequate organisational structures to strategic business development.

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