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SSM Samba: A Survey of Brazilian Approaches to Soft Systems Methodology (1999-2005)

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SSM Samba: A Survey of Brazilian Approaches to Soft Systems Methodology (1999-2005)

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Abstract: This paper reports the results of a survey intended to discover the manner in which Soft Systems Methodology (SSM) is understood and used in Brazil. The focus is upon SSM papers published in national and international journals, and conferences, incorporating a refereeing procedure. To be included in the survey, publications had to meet at least one of the following criteria: (a) authorship is clearly of Brazilian nationality; or, (b) authorship is affiliated to a Brazilian institution; or (c) application is set in Brazil. Similar surveys reporting on the United Kingdom, Australia and, to a lesser extent, Spain have been published previously in the literature. This paper, therefore, contributes to the growing international understanding and usage of SSM. Ultimately the paper serves as an initial map of the developing context in Brazilian SSM theory and practice.

Key words: soft systems methodology, systems thinking, survey, Brazil

1. Introduction

This paper reports the results of a survey intended to discover the manner in which Soft Systems Methodology (SSM) is understood and used in Brazil. The focus is upon SSM papers published in national and international journals, and conferences, incorporating a refereeing procedure. To be included in the survey, publications had to meet at least one of the following criteria: (a) authorship is clearly of Brazilian nationality; or, (b) authorship is affiliated to a Brazilian institution; or (c) application is set in Brazil.

Similar surveys reporting on SSM practice in the United Kingdom (Mingers and Taylor, 1992), Australia (Ledington and Donaldson, 1997) and, to a lesser extent, Spain (Paucar-Caceres, 2000) have been published previously in the literature. Kreher (1994)

has also contributed by reporting on two years of Masters degree SSM projects undertaken at Lancaster University where the methodology was developed. No less insightful has been the general survey on Problem Structuring Methods (PSMs) undertaken by Mingers (2000), leading Mingers and Rosenhead (2004) to note 'the predominance of SSM as either a methodology by itself, or as one used in combination with other methods'. Holwell (2000) extends the general knowledge of SSM theory and practice by demonstrating how the literature betrays varying, and at times questionable, interpretations of the methodology. More recently, van de Water et al (2007) have proposed a classification scheme of SSM publications. Taken together, surveys such as these indicate that the practice and theory of SSM constitute an area of constant interest for professionals, managers, consultants and academics. The present paper, therefore, seeks to contribute to the growing international interest in SSM understanding and use.

2. Background

This is the first attempt to report on SSM in Brazil. Indeed, there have been no SSM surveys focused on any South American country. Undoubtedly, a regional/continental – as opposed to merely national - survey could identify intra-continental similarities and differences in SSM theory and practice which could help promote regional dialogue. A regional survey is also perceptibly necessary given that the field of systems thinking is very much alive in distinct regions of South America. In Venezuela, for example, the University of Los Andes in Merida has a Department of Systemology whose approach was first documented by Fuenmayor (1991a,b,c) in the journal *Systems Practice* [now *Systemic Practice and Action Research* (*SPAR*)]. The Departments of Industrial Engineering and Systems Engineering of the University of Los Andes in Bogotá, Colombia, have also published cases of systems thinking practice (see, for example, *SPAR* Volume 14, Number 2). One should also not fail to mention the widely acclaimed work on autopoesis developed by Maturana and Varela (1992) at the University of Chile. Brazilian systems thinking research output has been minimal in the face of developments elsewhere on the South American continent – a fact lamented in one of the papers collected in the survey (Costa, 2003).

The years 2005 and 2006, however, witnessed a sudden Brazilian surge in published systems thinking research, and especially SSM-related research. The year 2005, for instance, saw the inaugural systems conference of the Brazilian Chapter of the

International Society for the Systems Sciences (ISSS). The conference was held at the University of São Paulo's (USP) Riberão Preto campus. Seventy participants attended, including two past presidents of the ISSS who gave respective talks. Thirty refereed papers were presented. The news made the 2006 *General Systems Bulletin* (volume XXXV) of the ISSS. In 2006, *SPAR* issued a special issue (Volume 19, Number 5) with selected papers from the 2005 conference. And 2006 saw the second conference in October at the same location, whilst the third conference in 2007 is set to take place at the Federal University of Santa Catarina, in the state of Paraná. Meanwhile, in related developments, October 2006 also saw the first conference of the Brazilian system dynamics society being held in Brasilia, whose international line-up confirmed that Brazilian systems thinking is beginning to receive wide recognition.

The present paper traces SSM developments in Brazil from the initial publications in the late 1990s to the 2005 USP conference, the latter event furnishing a degree of recognition for Brazilian systems thinking on the international stage. In total, 17 SSM papers meeting the aforementioned criteria were identified. An overall picture of the types of issues addressed in the papers, along with their frequency, is given in Table 1.

Issues Addressed	Number of papers
Case study (SSM application in context)	13
Tutorial (explications of SSM)	6
Development (innovative contributions to SSM)	4
Basic Survey	3

Table 1: Main areas of concentration uncovered by the survey, and the number of papers in which they were addressed

As shown in the table, most papers discussed – in varying degrees of detail – some application of SSM in the form of a case study. Three papers also provided a basic survey as part of their discussion: two of these outlined various decision support aids (Gomes and Soares, 2000, 2001), and one provided a basic introduction to SSM published research on the international and national (Brazilian) scale (Costa, 2003). It is noteworthy that all the papers appreciate SSM as a seven stage process in accordance with what Checkland has labeled *Mode 1* (Checkland and Scholes, 1990: 280-284; Checkland, 2000) – that is, the classic approach to SSM summarized by Checkland in Rosenhead (1989: 71-100) and Rosenhead and Mingers (2001: 61-89).

A working hypothesis of the research was that the majority of papers would include learning or tutorial tips on the methodology, given that SSM is relatively new to Brazil. This, however, proved not to be the case – only 6 out of the 17 papers (35%) offer some sort of tutorial. Moreover, of the 17 papers, 4 (or almost 25%) put forward some innovative suggestions, either for the theory or for the practice of SSM. This proportion is worth highlighting: SSM is a relative newcomer to Brazilian shores, and yet innovative developments have already begun to appear. On the other hand, evidence of SSM innovation is concentrated to the years 1999-2001 which focused upon multimethodological usage (see the Soares papers in the next section), and then only reappears in 2005 with a reconfiguration of the methodology itself (Georgiou, 2005).

3. Beginnings: 1999-2001

The earliest, publicly available, Brazilian SSM paper meeting the survey's criteria dates back to 1999. It is the paper by Soares, Cosenza and Gomes (1999), published in the prestigious *Revista Marítima Brasileira (RMB)*. According to its references, there are only three prior Brazilian sources of SSM. Two of them do not meet the criteria of the present research, but are worth mentioning: Cosenza's own 1997 lecture notes from the Federal University of Rio de Janeiro (UFRJ), and Soares' 1997 Masters degree thesis from the same university – indicating that SSM has been taught and researched at UFRJ at least since the latter half of the 1990s. The third reference is to a 1997 SSM paper presented by Soares and Thiollent (1997) to a marine-related operational research and logistics symposium in Rio de Janeiro. The survey was unable to obtain this paper through the public domain of journal/conference proceedings. It was also not clear whether this symposium incorporated a refereeing process. It may be assumed that the content of Soares et al's *RMB* paper of 1999 is similar to that of the 1997 symposium paper.

Interestingly, the group of authors associated with Soares appears to hold a monopoly on published Brazilian SSM research between the years 1999 and 2001. During this time, the group published a total of four papers: Soares, Cosenza and Gomes in *RMB* (1999) and in the leading Brazilian management journal *Revista de Administração* published by USP (2001); and, Gomes and Soares in *RMB* (2000, 2001). From 2002 onwards, Brazil sees new authors appearing and, conspicuously, the Soares group all but disappears from published accounts of SSM. To date, the authors remain cited in

only one paper: Costa (2003) who, incidentally, confirms the authors' publication monopoly up to 2001.

It is curious how a substantial monopolistic advantage has led to minimal recognition from new researchers; especially so, given that the papers by the Soares group remain among the most sophisticated in the Brazilian SSM literature. This is not only due to their treatment of the methodology itself, but also to the manner in which they interweave multi-methodological and decision-making issues. As such, they merit especial attention for more than merely chronological reasons.

The first paper, Soares et al (1999), puts forward suggestions that respective qualitative methods can be associated with each one of SSM's seven stages in order to aid decision making based on the methodology. This is not an introductory presentation of SSM – as one might expect of an early paper which, it might be assumed, seeks to introduce the methodology in an elementary manner to new regional audiences. The paper is essentially addressing the use of multiple methods in conjunction with SSM. In itself, this is a relatively complex topic and not one expected to be understood easily by an audience with relatively little or no knowledge of SSM to begin with. The *RMB* is a refereed publication, however, and the appearance of this relatively sophisticated paper indicates that *RMB* readers might be more familiar with SSM than one might assume.

The authors divide their discussion as follows: a general discussion of methodology, method, and technique; an introduction to SSM; a discussion of a number of group decision support methods; and, suggestions regarding the applicability of these latter methods to SSM's seven stages. For the authors, SSM is a qualitative group decision support method which may be complemented by other decision approaches. The authors' argument is *not* based on a perception that SSM *requires* complementary techniques in its seven stages; the complements are posited as merely helpful tools for enhancing any one of the respective SSM stages.

The authors' choice of complementary methods is based on these methods having established some track record in decision making studies. The authors describe them in terms not unlike those used to describe PSMs in general (Rosenhead, 1989; Rosenhead and Mingers, 2001): the methods allow for variability in use; allow combinations

between them; emphasize perceptions and assumptions; enable learning; are useful for non-repetitive problems which unite people into temporary problem-led groups; demand time and dedication from those involved; and, become more effective and efficient with constant use. The authors also set down certain conditions for their use, conditions not unlike those for Rosenhead's (1989: 12) 'alternative paradigm' to decision support, as well as those suggested by Eden (1989; Eden and Ackermann, 2001) when discussing conditions for using Strategic Options Development and Analysis (SODA): they require commitment from the top management, a participative organizational culture, workable degrees of common interests and objectives between the actors (not necessarily agreement on how to reach them), effective planning and management of the process and, ultimately, the possibility of feedback. The authors' ascription of complementary methods to each of the seven SSM stages is given in Table 2.

SSM stage	Suggested Complementary Method
1	brainstorming, interviews, documentation analysis
2	cognitive maps
3	Cause-effect/fishbone/Ishikawa diagram, cognitive maps, Nominal Group Technique
4	quantitative modeling, econometrics
5	PNI technique - also known as PMI (de Bono, 1994)
6	Force field analysis (Lewin, 1975)
7	Decision trees

Table 2: Complementary methods ascribed to respective SSM stages (according to Soares et al 1999). References are provided for methods not normally associated with operational research or problem structuring methods.

The authors state that the combination of respective SSM stages with complementary methods enable the researcher/analyst to appreciate the organization in a systemic manner. They differentiate SSM as providing an overarching view or understanding, whilst the complementary methods enhance the analytical power of each stage of the methodology. No examples of heightened analytical effectiveness are given so, at face value, the authors' combination of SSM with complementary methods provides a framework for SSM use which future research could test.

An underlying aim, however, is to instill a sense of the possibilities inherent in the framework. The framework is subtly proposed as a way out of (what are perceived as) unproductive decision making processes in Brazil and, for the authors, this stagnation is

evident on the higher and lower levels. On the high level, the authors (Soares et al, 1999) claim that:

> Brazil is a casuistic country. It has become the country of contingent decisions, provoked by discontinuous administration. [all citations are direct translations from the original Portuguese]

To put this in a planning perspective, for the authors Brazil follows a model of incrementalism (Lindblom, 1959) without having expunged this approach's weaknesses (Dror, 1964). SSM is proposed as a way out of this vicious circle due to the methodology's ability to provide overarching, systemic appreciation of problematic situations. In order to avoid the trappings of rational comprehensive planning (Altshuler, 1965; Hudson, 1979) that such an overarching tendency might employ, however, the complementary methods are proposed whose analytical foci can help lend a voice to the lower level of the shop floor which:

> innovates a lot; Brazilians are very versatile and creative; actually it is these workers who know what the problems are, but they are not listened to, and so they do not make themselves heard. (Soares et al, 1999)

The authors propose a framework, in other words, with a revolutionary subtext, urging the importance, in the Brazilian context, of systemic decision making that takes into account the higher and lower levels simultaneously. This approach is well-known as mixed scanning (Etzioni, 1967). In summary, the first Brazilian SSM paper not only provides a relatively sophisticated framework for decision making, but also stands as a manifesto for socio-political change.

Two years later, Soares et al (2001) republished their paper with minor modifications in the influential *Revista de Administração*. This offered the opportunity to reach a wider range of Brazilian decision makers. They retained the associations shown in Table 2. This time, however, they offered their complementary methods as a requirement for SSM's effective realization, implying that SSM on its own is not good enough:

> Each of SSM's seven steps requires a qualitative or even quantitative technique… so that the methodology's application increasingly becomes more consistent and

> efficient in acquiring analytical results and organizational diagnostics. Whilst the integral vision of SSM helps to delimit the steps of an investigation, the complementary techniques in each step help obtain specific results.

Furthermore, the authors claim that the coupling of the seven SSM stages with complementary methods leads to the following derivative benefits:

1. a quicker and more efficient investigation;
2. the provision of a beneficial intervention apparatus;
3. a delineation of the research steps;
4. greater process transparency;
5. a higher degree of participation;
6. the substantiation of a democratic process;
7. an increase in the decision-making confidence of the involved; and,
8. an increase in the responsibility of the involved.

Soares et al have yet to provide empirical evidence for these claimed benefits. As multi-methodological frameworks, however, their two papers remain in a league of their own as far as Brazilian SSM research is concerned. In essence, they point toward the possibilities of multiple criteria decision making (MCDM) through the use of SSM. How it is that they came to propose exactly such an approach is not obvious, until one turns to the paper by Gomes and Soares (2000). Of the four papers by the Soares group, this is the only one that cites Daellenbach's (1994) paper on the possibilities for MCDM within SSM.

In contrast to the Soares et al (1999, 2001) papers, the Gomes and Soares (2000, 2001) papers are notable for including SSM as part of a wider discussion on decision making, and soft OR in particular. They appear to be the first papers in the Brazilian decision making literature to so include SSM. In this respect, they serve quite nicely as Portuguese-language introductions to soft OR, its *raison d'être*, and the place of SSM in this field.

Gomes and Soares (2000) undertake a comparative analysis of MCDM and soft OR, with special emphasis on SSM. Their approach is comprehensive, presenting issues

such as: the historical emergence, and advantages, of MCDM and PSMs and the contexts for their use; a three-tier classification of problems and four conditions in which decisions are taken; the constructivist, descriptive, prescriptive, and normative approaches; definitions of terms such as decision maker, affected, interventionist, facilitator, and analyst; and the distinction between dominant and non-dominant solutions. The paper even offers brief introductions to PSMs such as SODA, Strategic Choice Approach, Robustness Analysis, Metagames, and Hypergames - primarily referenced to Rosenhead (1989), but with some additional references from the journal literature. Indeed, this paper appears to be the first to formally present PSMs to a Brazilian audience.

Gomes and Soares (2001) is a more prescriptive paper. Here, the authors review fourteen decision making approaches from the literature (SSM being the fourteenth, and the only PSM). They integrate their results into a 13-step methodology, complete with premises, suggested difficulties, warnings, and significant variables. Their proposed methodology may be seen as an extended approach to the traditional seven-step process of OR as described, for instance, by Winston (2004: 5-6). Although useful as an introduction to problem solving, their description of their proposed methodology makes no reference as to how exactly SSM informs it. Nevertheless, the relevance of either of the Gomes and Soares papers to SSM should not be minimized. Theirs are the first papers to introduce SSM to the Brazilian audience as a decision making methodology of equal value to other, perhaps better known, approaches.

In summary, the Soares group of authors is the first to introduce SSM to Brazil in accordance with the criteria of the survey. The introduction has not been of the elementary type one would expect when presenting to a new regional audience. Instead, SSM has been introduced as the basis for a multi-methodological approach to multiple criteria decision making, and as an approach worthy of consideration by Brazilian decision makers. Published Brazilian SSM research has not addressed the scope and ambition afforded by the Soares group. Indeed, as mentioned earlier, the new wave of Brazilian researchers from 2002 onwards appears to have ignored the challenge (willfully or not).

4. Development: 2002-2004

The period 2002-2004 merits separate attention for two reasons. First, it stands between the initial work of the Soares group and the 1st ISSS Brazilian Chapter Systems Conference held at USP. Second, all seven SSM papers published during this period report empirical applications of SSM – in contrast to the theoretical emphasis of the Soares group. Three of the papers were published in Brazilian academic journals that adopt a blind peer review refereeing system (Lunardi and Henrique, 2002; Costa, 2003; Bellini et al 2004). One paper (Ferrari et al, 2002) was published in *SPAR* which, according to its description, advocates 'a rigorous mentoring-based refereeing system'. Two of the papers are from the 2003 Third International Conference of the Iberoamerican Academy of Management held at the AACSB/EQUIS/AMBA-accredited Escola de Administração de Empresas de São Paulo of the Fundação Getulio Vargas (FGV-EAESP) (Mauad et al, 2003; Graeml et al, 2003). A seventh paper has been included which, although not quite matching the criteria of the survey, merits particular attention due to its content and its intended audience (Lamb, 2002).

The first thing worth noting is that seventeen different authors are distributed among the seven papers (only one, Martinelli, appears in two papers). For a methodology that is perceived to be relatively little known in Brazil, this is a surprising amount of researchers applying it within the span of only three years. Two relatively large groups are at USP and the Federal University of Rio Grande do Sul. All affiliations, except for the University of Brasilia, are in the southern regions of the country (see Table 3).

Affiliation	No. of authors
Universidade de São Paulo (USP)	4
Universidade Federal do Rio Grande do Sul (UFRS)	4
Universidade Federal de Santa Catarina (UFSC)	3
Universidade Federal de São Carlos (UFSCa)	2
Universidade do Vale do Rio dos Sinos (UNISINOS)	1
Faculdade Cenecista Nossa Senhora dos Anjos (FACENSA)	1
Pontificia Universidade Católica do Rio Grande do Sul (PUC-RS)	1
Universidade de Brasília (UnB)	1

Table 3: Number of authors and affiliations for the period 2002-2004

The spread of applications is also worth noting. Two cases concern high-level policy issues and evaluation (Mauad et al, 2003; Lamb 2002), whilst another two apply SSM to course design issues within particular university faculties (Lunardi and Henrique, 2002; Costa 2003). Only one application is directly concerned with a private company client (Ferrari et al, 2002), whilst the remaining two cases address the needs of philanthropic and community groups (Graeml et al, 2003; Bellini et al, 2004). That is to say, SSM has already been applied to questions of policy, academia, private enterprise, and the community. Table 4 summarizes the results.

Organization Type	Application Area
Automotive components distributor	Performance improvement
Philanthropic	Resource acquisition management
Academic (university)	Course design (2 papers)
Community group	Urban planning
Public administration of industry	Evaluation
Corporate governance institute	Organizational design

Table 4: Applications of SSM 2002-2004

When it comes to how SSM was actually used, however, the content of the papers reflects mixed and usually unclear or unsubstantiated results. Although all papers claim to an above average success, only one explicitly reports validation of the model and its results by the client (Bellini et al, 2004). Furthermore, only two report on problems encountered: Ferrari et al (2002) cite the negative impact of power and divergent perceptions on model implementation, whilst Bellini et al (2004) suffered similar issues, along with operational constraints to implementation as well as the inability to work with groups, having to settle instead with individual interviews.

It is also difficult to judge the degree of adherence to methodological rigor. For instance, a comparison between what was conceptually acknowledged and what was actually used reveals wide discrepancies. For example, CATWOE was acknowledged by most as well as evidenced in their respective paper, although adherence to the transformation rules of SSM appears explicitly in only one paper (Graeml et al, 2003). Evidence of root definitions (which are supposed to reflect, integrate and clarify CATWOEs), although acknowledged by most, was generally lacking. Many spoke of the requirement to design more than one conceptual model in an SSM application, and

yet none of the papers provide evidence that this was actually done. Five papers do show one conceptual model, but the degree of sophistication varies and in all cases the substance of the model is questionable – for instance, only two papers actually use control criteria which are part and parcel of conceptual model building. Finally, although one paper noted the role of SSM's three Analyses (Costa, 2003), none provided evidence of their use. Given the importance placed on these Analyses by Checkland (2000), the manner in which they can effectively underpin and inform the use of subsequent SSM elements (Georgiou, 2007), and the fact that all papers praised the ability of SSM to facilitate information gathering and learning (the explicit function of the Analyses), their lack is deemed particularly significant. These and other discontinuities are summarized in Table 5.

SSM Elements	Frequency of:	
	conceptual acknowledgement	evident use
Analysis 1	1	0
Analysis 2	1	0
Analysis 3	1	0
CATWOE	6	6
Comparison	5	4
Control criteria	2	2
Identify changes	5	4
Multiple individual CMs/HASs	4	0
One individual CM/HAS	5	5
Rich picture	4	4
Root definition	6	3
Systemically desirable/Culturally feasible	3	1
Transformation rules	1	1

Table 5: Frequency of conceptual acknowledgement and evident use of SSM elements (2002-2004)

Of the seven papers covering this period, one was mentioned earlier as not having strictly met the criteria of the survey but as having nevertheless merited an inclusion. This is the paper by Roberto Lamb (2002) of the Federal University of Rio Grande do

Sul. The paper is an extract from a larger study by the author, and was presented as a discussion paper to the Brazilian Institute of Corporate Governance (IBGC) in São Paulo during the latter half of 2003. The paper appears to have been influential since many of its key recommendations appear two years later in the IBGC guide to fiscal councils (IBGC, 2005), a 76-page document that lists Lamb as one of two coordinators. This is a distinct case of publicly visible implementation of detailed recommendations based upon an intricate SSM analysis. More than that, however, even though not all aspects of SSM are reported, it is an SSM paper written by a confident expositor and practitioner.

Lamb (2002) addresses the conflict in roles between the Administrative Council (AC) – which sits between the board of directors and the shareholders - and the Fiscal Council (FC) – a legally required committee in Brazilian publicly quoted companies that reports to the shareholders. This conflict is either potential or it materializes because of ambiguities in the law directing the responsibilities of each council. The paper aims to clarify the definition, duties and reach of the FC. It also aims to contrast these with those of the AC. In this way, the two councils may be appreciated as distinct and as responsible for different areas.

Drawing upon observation and interviews, a basic model is first provided which reflects pre-SSM understanding of the role of the FC. The FC is initially placed into a controlling sub-system of the supersystem “company”. The AC is also seen as constitutive of this subsystem. The paper then details three SSM iterations, affording a reasonably close look into the logic, mechanisms, and gradual justifications which lead to a new understanding of the FC. By the end of the third iteration, the FC has moved out of its original subsystem and into the “fiscal control” subsystem, constituted by very different entities whose interests might be very different from that of the company itself - entities such as banks, external auditors, suppliers, employees and so on.

It appears that, with the aid of SSM, the understanding of the real function of the FC has completely changed and that, moreover, the new understanding appears to match more closely the spirit of the law. The FC defends the company but in the interests of the wider societal whole: it maintains the ethic of corporate social responsibility. The AC,

on the other hand, defends the company on the company's own terms and in its own interests.

Lamb (2002) provides a very rich SSM analysis, albeit focused largely upon CATWOE and root definitions (RDs) (SSM's three Es are defined and used towards the end). The paper provides a glimpse of how understanding developed, and makes a case for each new iteration. With an eye on the appendix, which lists in detail the divergent viewpoints of all involved, as well as on an extensive list of problematic factors discovered through the application of SSM, the reader is offered a degree of insight into SSM workshop dynamics that none of the other papers provide. Apart from formal modeling, in other words, the reader is given an insight into the subtleties of why and how things were modeled as they were. Lamb's exposition even takes the time to distinguish between problems and problematic situations – a distinction lying at the heart of problem structuring applications such as those of SSM (Rosenhead and Mingers, 2001). He moreover emphasizes that the CATWOE governs the RD – the latter being an integrative statement of the former list. Surprisingly, consensus on an SSM fact such as this is difficult to find between the other six papers of the period. In brief, Lamb (2002) provides a very public Brazilian SSM application as well as a good pedagogic resource in Portuguese. Indeed, the only main objection to Lamb's SSM study is that it has not been offered for peer-reviewed publication.

5. Recognition: 2005

In August 2005, the VIII SEMEAD conference (*SEMinários Em ADministração*) was hosted by the Faculty of Economics, Administration, and Accounting (FEA) of USP. The SEMEAD annual conference is recognized as a prime national venue for the presentation of research into aspects of managerial administration. One SSM application appeared at that conference (de Castro et al, 2005). In November, the 1st International Society for the Systems Sciences (ISSS) – Brazilian Chapter Systems Conference was held at USP's Riberão Preto campus. Five SSM papers appeared at that conference, of which two – Georgiou (2005) and Pinheiro et al (2005) – later appeared in *SPAR's* special conference issue (Georgiou, 2006; Pinheiro et al, 2006). Except for Georgiou, all SSM authors publishing in 2005 are from USP, indicating a major shift in institutional concentration when compared with the period 2002-2004. The discussion begins with a brief commentary on the papers by Georgiou and Pinheiro et al. The focus then shifts to

four papers presented at the ISSS USP conference, all of whose authors are affiliated to USP.

The problem faced by de Castro et al (2005) concerns a certain university-level course meeting criteria set by the Brazilian Ministry of Education so that it may receive the Ministry's accreditation. It should be noted that, although such procedures suffer from bureaucratic exigencies, the process itself is fairly unsophisticated. This raises the question as to why SSM is deemed necessary at all. Indeed, the paper offers little in the way of evidence that SSM was actually used – only one CATWOE is offered, unsupported by either a root definition or a conceptual model. Moreover, the end product appears not as a systemic model at all, but as a list of things to do that directly reflects the requirements set by the Ministry. As such, it is at best unclear as to how SSM was actually helpful in this situation.

Georgiou (2005) argues for the effectiveness of SSM as a decision support tool for information-poor contexts. The case is made that decision making effectiveness can be understood as the ability to answer three questions: (1) given sparse knowledge of a problematic situation, how is it possible to extract information from it?; (2) if such information can indeed be extracted, how can it be structured in a way which enables rigorous problem definition?; and (3) if a problem can indeed be defined rigorously, how can this definition be used to inform a systemic approach toward resolution? Managerial effectiveness, in other words, is to be understood as the ability to make systemic decisions in the absence of clear facts. A configuration of SSM is presented which addresses the three questions and which can thus facilitate useful and practical systemic results in the face of partial or minimal information. In addition to providing a theoretical basis for discussing managerial effectiveness, a decision making model which renders the theory operational (Georgiou 2005, 2006), as well as an empirical example of its use (Georgiou, 2007) - thereby demonstrating the extent of the systemic possibilities for decision making in seemingly paralyzing contexts - the research simultaneously provides a teaching and training tool for disseminating SSM, as well as a high-level blueprint from which to begin considering software support for the methodology.

The remaining four SSM papers presented to the ISSS USP conference were by USP-affiliated authors. They have been singled out in this section because USP, and especially its Ribeirão Preto campus where the conference was held, is one of the few Brazilian academic centers that actively promotes SSM theory and practice, both in teaching and research. This development is largely due to a member of its faculty, Professor Dante Martinelli, whose books discuss SSM in varying degrees of detail (Martinelli, 2002; Martinelli et al, 2006). Given this, the survey approached these papers with the view that their content would provide a good reflection on this center's SSM understanding and practice, especially since they were presented in an ISSS regional conference held at a campus with which the authors are affiliated. When one adds that USP is not only nationally but also internationally recognized as a center of academic excellence, as well as that all four papers reported on SSM applications, the survey particularly expected a relatively high degree of evident theoretical and practical SSM sophistication which could be interpreted as pushing the frontiers of Brazilian SSM research.

Unfortunately, the expectation was not quite met. To begin with, the survey compared three different occurrences of SSM tools in the papers: (1) SSM tools acknowledged as part of a theoretical introduction or presentation of the methodology; (2) SSM tools claimed as having been used in the application under consideration; and (3) concrete evidence of the use of SSM tools. Table 6 summarizes the results.

SSM Element	Acknowledged	Claimed use	Evident use
Analysis 1	2	1	0
Analysis 2	1	0	0
Analysis 3	1	0	0
CATWOE	4	4	3
Comparison	4	3	3
Control criteria	1	1	0
Identify changes	4	4	4
Multiple individual CMs/HASs	3	0	0
One individual CM/HAS	1	1	0
Rich picture	3	2	1
Root definition	4	1	2
Systemically desirable/Culturally feasible	4	3	3
Transformation rules	1	1	0

Table 6: Comparison of SSM tools acknowledged, claimed as used, and shown as used (four USP-authored papers presented to ISSS-Brazilian chapter conference of 2005)

The majority of SSM tools are initially acknowledged by the papers, although not uniformly amongst them. A decrease is then evident in the number of tools claimed as having been used in the respective application. An even more notable decrease occurs when one searches for concrete evidence of the use of the tools. For example, although two papers claim to have used rich pictures, only one of them actually provides one. Furthermore, although all the papers in question acknowledge conceptual models of some variety, none provide evidence of their use – the one exception is Pinheiro et al (2005, 2006) who claim that they are providing a conceptual model, but what is shown is more like a high-level tripartite schematic which requires much lower level detail if it is to be accepted as an SSM conceptual model.

The significance of providing evidence of the use of SSM tools is debatable. It is often the case that authors do not provide illustrations of their own use of particular methodological tools, and yet their results are accepted (either on faith or due to the description offered). A case in point is the series of multi-methodological papers

published by Ormerod (1995, 1996a,b, 1998, 1999, 2005; Pauley and Ormerod, 1998) which provide selective evidence either, for example, due to reasons of confidentiality, of space, or of style. On the other hand, it could be argued that researchers working in regions which are relatively new for SSM might be especially interested in providing as much evidence as possible of the use of SSM tools in their papers. Such provision would not only serve to justify their analyses but also serve to illustrate SSM in action to interested regional parties who would be consulting such papers. This is especially the case here where all papers discuss in quite some detail final results, emphasizing the application of the comparison stage, the identification of changes, and the delineation of systemically desirable and culturally feasible changes. The lack of analytical evidence renders it difficult to judge how rigorously such conclusions have been drawn. For example, Cezarino et al (2005) explicitly claim that their solution stems from the use of a cybernetic tool and a systemic focus, but this is far from demonstrated in the paper.

Theoretical understanding of SSM is also confused. For example, Abrantes et al (2005) simultaneously talk about 'root definitions of *the* system in question', and 'conceptual models that can *define* the relevant systems for the situation' (italics added). They do not make clear, in other words, that each system is related to one root definition, and that it is these latter that actually serve as definitions of respective systems. In another instance, the authors compare the real situation with a conceptual model upon which are brought to bear multiple *Weltanschauungen*. A switch in *Weltanschauung* within a CATWOE more often than not triggers changes in a conceptual model, and yet the authors' conceptual model remains unchanged, rendering the relevance of the multiple *Weltanschauungen* questionable. In general, it is unclear, throughout the paper, whether the authors are talking about one system, multiple conceptual models for multiple relevant systems, multiple conceptual models with respective root definitions, or, questionably, one final conceptual model with multiple associated *Weltanschauungen*. Venturi et al (2005), for their part, claim that root definitions must first be created and then 'validated' by CATWOEs – contrary to established SSM understanding which acknowledges that the root definition is an integrative statement of the CATWOE and, as such, follows the designing of the mnemonic.

If, on the one hand, the USP authors betray theoretical confusion and ambiguous practical demonstration, they do, on the other hand, demonstrate a willingness to test the

methodology in a diverse range of contexts. Cezarino et al (2005) tackle performance improvement in an advertising agency; Abrantes et al (2005) tackle the impact of operational changes in different sectors of a commercial bank; Venturi et al (2005) explore what information needs are required to manage the logistics of a brewery; and Pinheiro et al (2005, 2006) explore ways in which technology can be accessed by those who are otherwise technologically (and, in this case, therefore socially) excluded. This is an impressive array of SSM application areas, considering that they were all presented at one regional conference held for the first time. It signals that the USP authors believe in the wide applicability of SSM. Despite the ambiguities evident in their papers, therefore, the diverse applications offer the authors, as a group, a growing knowledge base that can inform future SSM theory and practice. It is perhaps due to this that the USP Riberão Preto campus is seen as somewhat of a systems thinking beacon in Brazilian research circles (and, undoubtedly, by the ISSS itself).

6. Conclusion

The general conclusion to be drawn from those published Brazilian SSM papers surveyed here is that they demonstrate a mix of varying degrees of theoretical understanding, some distinctly innovative SSM research, and a contextually rich series of attempted applications. With the exception of perhaps a couple of papers, theoretical understanding of the methodology itself remains on a basic level. This may be due to the limited international references evident across most papers. The majority of the papers cite Checkland's (1981) *Systems Thinking, Systems Practice* which provides the classic presentation of SSM. In the three cases where this work is not cited, the authors respectively refer to one of Checkland's concise summaries (Checkland, 1989), Checkland and Scholes' (1990) practical demonstrations (which are cited by seven papers overall), and, to Martinelli's (2002) own exposition of SSM. Editions of *Rational Analysis for a Problematic World* (Rosenhead, 1989; Rosenhead and Mingers, 2001), which present problem structuring methods and chapters on SSM, are cited by four papers. Only one paper (Gomes and Soares, 2000), however, discusses the wider family of problem structuring methods. Three papers cite von Bertalanffy's (1968) classic work, as well as the Portuguese translation of Pidd's (1997) *Tools for Thinking*. Aside from these bibliographic commonalities across most papers, two other sources make an appearance that is perhaps worth mentioning: Wilson's (2001) detailed conceptual model building, and Martinelli et al's (2006) recent text on systems thinking approaches

which promises to become a set Portuguese-language introduction to the field. Most papers provide little evidence of mining the journal literature for advanced insights into SSM. Given that Brazilian university libraries now have electronic access to almost any journal in the world, future SSM publications will probably reflect wider bibliographies.

1999	1
2000	1
2001	2
2002	3
2003	3
2004	1
2005	6

Table 7: Frequency of Brazilian SSM publications per year

It is difficult to say for sure whether Brazilian SSM research is increasing – Table 7 shows the yearly frequencies. Between 1999 and 2003, a slow but increasing trend is evident. 2004 reverses this trend. However, with the advent of the 2005 ISSS-USP conference (that saw 5 SSM papers) a distinct increase is evident. The fact that this conference is largely responsible for a distinct chunk of SSM research suggests certain conclusions. One is that Brazilian SSM research might, for the foreseeable future, grow in proportion to the holding of appropriate conferences such as those of the ISSS. Another related conclusion is that, given the mixed theoretical understanding of the methodology evident in the publications discussed here, appropriate conferences might be the preferred mode of dissemination, since they offer the authors concerned the opportunity to meet like-minded colleagues in order to discuss results and contribute to their own learning. It would appear that the ability to organize regionally-focused conferences, by those international or regional societies interested in SSM research, is a key factor in ensuring the theoretical and practical growth of the methodology in Brazil.

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