Unveiling barriers to sustainable public procurement in emerging economies: evidence from a leading initiative of sustainable supply chain in Latin America

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Abstract

In light of the theory of ecological modernisation, this is the first work to explore the organisational barriers that have been affecting one of the most significant sustainable public procurement initiatives in Latin America: the Brazilian Environmental Agenda for Public Operations Management (called 'A3P Programme'). After conducting a survey with program managers, the first recommendation based on the results is to group the barriers analysed into five aspects: organisational culture, motivation, economic uncertainty, market, and operations. Further recommendations are that the 'organisational culture' factor stands out as a particular barrier to sustainable public procurement, and that ecological modernisation theory can be useful in understanding why variables related to costs and budget are not barriers to preventing sustainable public procurement initiatives.

Keywords: sustainable operations; sustainable public procurement; sustainable supply chain; sustainable purchasing; Latin America.

1. Introduction

Based on the principles of Ecological Modernisation Theory (Zhu *et al.*, 2013) applied to sustainable operations (Sarkis *et al*., 2011; Walker *et al*., 2014), the objective of this work is to analyse the main barriers to sustainable public procurement (Brammer & Walker, 2011) in Brazil. Sustainable procurement has been considered a key practice of more sustainable supply chains in emerging economies (Mathivathanan et al., 2016; Mani et al., 2016; Kusi-Sarpong et al., 2015). The Brazilian public sector accounts for 15% of the country's gross domestic product (GDP) through its acquisition of goods and services. This is equivalent to more than US $100 billion (Ministry of Planning, Budget and Management, 2012) and follows a worldwide trend of significant national spending on public procurement. Brazil has one of the 10 largest economies in the world and is part of important international groups – such as the BRICs and Mercosur. Although the country has a large economy, little attention is paid to it in studies addressing issues related to sustainability issues related to supply chain (e.g. Fahrnimia *et al.,* 2015). For example, there are works on sustainable public procurement exploring the situation in

countries such as China (Zhu *et al.,* 2013) and many developed countries, such as the UK (Brammer & Walker, 2012), but there is a significant lack of studies on Brazil. Additionally to this, the public sector has been re-shaped by contemporary developments in procurement that should be understood further (Panayiotou *et al*., 2004).

As a consequence of new environmental laws and governance systems (Jabbour *et al*., 2014), Brazil has, however, been working to transform the public sector and steer it towards sustainability. In recent decades there have been government efforts to expand sustainability initiatives, such as the development of the Environmental Agenda in Public Administration (A3P) program. This is a Ministry of the Environment (*MMA*) program whose objective is to encourage the adoption of environmental practices within public agencies and to gather information on the environmental practices that have been adopted. This is the largest public sector sustainable procurement program in Latin America.

However, although concern with sustainable public procurement has increased considerably in Brazil in recent years, few public purchases made in the country (Oliveira & Santos, 2014) incorporate any sustainability criteria. For this reason, it is important to understand the barriers that may be preventing A3P from achieving maximum success.

The study of barriers is appropriate in contexts in which the adoption of transformative measures for solving important issues is a challenge (Luthra *et al.*, 2015). The literature (Walker *et al.,* 2012) indicates that studies on this subject in developing countries are also extremely relevant because of the social impact they can generate.

In order to achieve the research objective, five steps were taken: (i) a survey of the literature on barriers to sustainable procurement was conducted in a search for useful variables; (ii) the variables found in the literature were tested against the opinions of specialists as to their formal suitability and content, in order to design the research questionnaire; (iii) a preliminary survey of organisations that might potentially respond was carried out; (iv) Survey Monkey was used to deliver the research instrument developed for collecting the data; (v) the data were analysed using correlation analysis and factor analysis with the help of IBM's SPSS software, which measured the relationships between the variables and categorised them into factor groups.

The main contributions of this research are: (i) a survey of the main barriers to sustainable public procurement in Brazil, which fills a gap in the literature on studies in developing countries and also enables new perspectives on the subject to be gained; (ii) a survey of possible relationships between variables, with the potential for increasing understanding of the phenomenon and providing a basis for theoretical studies to be prepared from them; (iii) the categorisation of the barriers, which allows for the structure of problems involving sustainable public procurement to be visualised.

2. Theoretical Basis

The field of sustainable operations management (Dubey *et al*., 2017) has increasingly attracted the attention of researchers and included topics such as sustainable supply chain management (Gunasekaran & Irani, 2014). This includes sustainable public procurement (Seuring & Muller, 2008), which is normally understood as the concept of sustainable procurement applied to the purchasing process carried out by the public sector (Oruezabalaa & Ricob, 2012) and defined by the search for sustainable development by way of the procurement process (Walker & Brammer, 2012). Sustainable procurement adds complexity to the variety of issues that have influenced contemporary procurement developments (Gunasekaran *et al*., 2009; Jin *et al*., 2015), particularly, the public procurement sphere (Panayiotou *et al*., 2004).

The discussion of sustainable public procurement began when relationships between the public and private sectors were analysed in terms of public procurement processes. As a consequence of the initial analyses, investigations have been conducted into how governments use the procurement process to encourage sustainable practices in private companies (van Hoof & Lyon, 2013), how local governments have been using the procurement process to develop sustainability (Blay-Palmer *et al.,* 2013; Preuss, 2007, 2009, 2011) and local economic development (Nijaki & Worrel, 2012; Mercado *et al.,* 2016), and adherence to government recommendations on sustainable public procurement by players from different spheres of government (Thomson & Jackson, 2007).

As far as existing research into barriers to sustainable public procurement is concerned,

qualitative studies into the public hiring process were identified (Testa *et al.,* 2015), as were assessments of initiatives on the subject (Morgan, 2008) and critical factors and conditions for making sustainable public purchases (Ageron *et al.,* 2012). Zhu *et al*. (2013) also investigated the relationship between motivators and practices in sustainable public procurement.

Among works which directly address the barriers to public procurement, those that are of particular note are the identification of psychological barriers to the adoption of sustainable purchases (Preuss & Walker, 2011), the assessment of opportunities and barriers in Malaysian organisations (Mcmurray *et al.,* 2013), and a comparative assessment of barriers and facilitators in an international context (Brammer & Walker, 2011). The main conclusions that have reached on this subject are that acquisition costs and budgetary constraints are critical barriers to the advance of sustainable public procurement initiatives (Zhu, Geng & Sarkis, 2013; Brammer & Walker, 2011; Walker & Brammer, 2009), and that support, attitude, organisational culture and leadership style are also factors that prevent sustainable public procurement (Roman, 2017; Islam *et al.,* 2017; Brammer & Walker, 2011).

The discussion on barriers to sustainable public procurement is still evolving and there is no definite consensus. In this light, this article aims to explore the subject through the lens of Ecological Modernisation Theory, since the Brazilian A3P program is aligned with this theory, which is used to explain the government's environmental initiatives for reconciling economic and environmental development (Sarkis, Zhu & Lai, 2011).

3. Methods

This work is based on a quantitative approach in the form of a self-administered survey questionnaire, which is a widely used technique in research into areas of management (Walker & Brammer, 2009; 2012; Walker & Preuss, 2008; Mcmurray *et al.,* 2014).

3.1. Sample definition and data collection procedures

Organisations that are part of the A3P government program were selected to take part in this research. Among its various guidelines this program includes the insertion of social,

environmental and economic criteria in the acquisition of goods, hiring services and carrying out work in the public sector (MMA, 2016a).

The Brazilian Ministry of the Environment (*MMA*) provided contact information, including the telephone contact numbers and email addresses of those organisations participating in the A3P program. A total of 189 public organisations were identified as being part of the program.

Elements of Dillman's Total Design Method (1991), as proposed by Hoddnot and Bass (1986), were used, but using the information provided by the *MMA* was subject to difficulties such as changes in telephone numbers and e-mail addresses. The organisations that were the target of the research were first contacted by telephone, at which point they were invited to take part in the research and to supply a valid e-mail address to which the questionnaire could be sent. After this initial phase, contact was made with the objective of increasing the rate of return of the research.

A total of 54 valid replies were ultimately obtained, giving a response rate of 28.5%. The number of replies is above 50, the minimum number usually accepted in the literature on exploratory factor analysis (Winter, 2009; Hair *et al.,* 2005). The objective of exploratory factor analysis is to identify the underlying relationships between variables (Hair *et al.,* 2005; Mulaik, 1987), offering the possibility of a theoretical interpretation of these correlations, making the number of replies suitable for the objective of this analysis.

3.2. Preparation of the research instrument

The questionnaire was prepared using the variables proposed by Walker and Brammer (2009) because of their acceptance by and consolidated position in the literature. In order to minimise problems of interpretation, translation and adaptation relating to the barriers proposed by Walker and Brammer (2009), a face and content validation was performed, in which the statements that had been drafted and translated were sent to a group of four researchers to check for clarity, meaning, and the possible interpretation of the statements. After completing the adaptation of the statements, three questions about the participating organisations (the particular agency involved, the position of the respondent and the time the agency had been taking part in the A3P program) were

included in the questionnaire.

The finalised questionnaire was placed on the Survey Monkey web-page, with questions structured on a five-point Likert scale for which five options were given: 5 - “I fully agree”, 4 - “I agree”, 3 - “I neither agree nor disagree”, 2 - “I disagree” and 1 - “I completely disagree”.

After the data had been collected, the results were analysed using SPSS 21.0 statistical software. The first step in the analysis was to prepare a descriptive analysis of the data, calculating the mean, mode, median, and standard deviation. Second, Spearman’s rank correlation analysis was carried out, which is used to measure the degree of correlation between two variables (x, y) and is a suitable method for data that do not follow a normal distribution (Frugolli, 2015). The relevant values of significance resulting from the analysis were collected. Finally, exploratory factor analysis was carried out in order to investigate patterns among variables (R-type).

Factor analysis is also accompanied by the KMO test, which indicates the adequacy of the sample size for analysis purposes in relation to the number of variables involved. In order to support the factor analysis, the following were also used: commonality measures, which represent the total variance that an original variable shares with all others; eigenvalue analysis, which is the amount of variance explained by a factor; and Cronbach’s alpha analysis, which is the reliability measure used in factor analysis, and whose lower acceptability values range from 0.6 to 0.7 (Hair *et al.,* 2005).

The questions about the organisations participating in the research made it possible to carry out the Kruskal-Wallis test (e.g. Ruxton & Beauchamp, 2008), which is used to detect patterns in distribution sets. The variables were organised according to Table 1.

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4. Results

4.1. Descriptive analysis

Table 2 shows that the highest average values were achieved by variables V5, “the disarticulation between public sector spheres in planning, organising, directing and controlling sustainable purchases”, with an average of 3.98, and V6, “the existence of conflicts between purchasing process priorities (for example: lowest price vs. quality and sustainability)” with an average of 3.83. This means that these are the main barriers to sustainable public procurement from the point of view of the respondents.

The lowest values were for the variables V11, “the perception that more sustainable products are associated with lower quality”, and V20, “the perception that investing in environmental purchases may threaten/generate competition in relation to the adoption of other initiatives and social projects”, which implies that these variables are not barriers to sustainable public procurement initiatives in Brazil, according to the perspective of the research respondents.

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4.2. Correlation analysis

Bilateral (or two-tailed) significance tests were used to estimate the *p* value. Although the results show considerable significant relationships between the variables, the loadings of the significant correlations are relatively low, with values between 0.34 and 0.48, which corresponds to weak to moderate correlation (Table 3).

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The highest significant ($p < 0.01$) loading is between variable V8, “the lack of attitudes and

organisational culture for supporting and strengthening sustainable procurement" and V9, "the lack of a long-term vision in the organisation that is compatible with the investment in sustainability", with a total loading of 0.683. Another significant correlation is between variables V13, "the lack of government policies that encourage sustainable public procurement" and V17, "the lack of incentives and pressure to adopt sustainable public procurement initiatives", with a correlation coefficient of 0.575.

The variables V3, "the lack of resources and organisational structure for making sustainable procurement feasible" and V6, "the existence of conflicts between procurement process priorities (example: lowest price vs. quality and sustainability)" had the highest number of significant correlations ($p < 0.01$).

4.3. Factor analysis

First of all, the sample was subjected to adequacy tests for factor analysis, and measures to check the validity of the sample were derived, such as the calculation of commonalities (Table 4). In the analysed data, there are both high values of commonality (v7) and low values (v18), but most have values between 0.5 and 0.75, which is considered high by the literature (Jung & Lee, 2011).

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The Kaiser-Meyer-Olkin (KMO) sample suitability test gave a result of 0.665, and Bartlett's sphericity test has a significance of 0.0001. Both results indicate the adequacy of the sample (e.g., LAU, 2011; SANGLE, 2010). The internal consistency analysis of the sample, Cronbach's alpha test, returned a value of 0.8453, indicating good sample consistency for factor analysis (MCMURRAY *et al.,* 2011).

To define the factor groups, a sufficient number of factors were considered for an eigenvalue equal to or less than 1. This resulted in a total of 5 factors, which were

classified as: a) Aspects of Organisational Culture; b) Motivational Aspects; c) Aspects of Economic Uncertainty; d) Market Aspects; and e) Operational Aspects.

The results of the factor analysis can be seen in Table 5.

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Factor 1 is represented by a cluster of 7 variables, listed in Table 6. Organisational culture, as defined by Schein (1983), can be understood as the basic assumptions a particular group has developed for dealing with certain problems relating to external adaptation or internal integration. Accordingly, the variables in Factor 1 share characteristics related to culture and behaviour, including the structure assumed by organisations.

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Table 7 shows the composition of the second factor, the motivational aspect. According to Hwang (2013), motivation can be considered to be the level of willingness to perform activities and tasks voluntarily when so requested. Motivation is perceived to be a common point among the variables that compose this factor, involving policies, pressure, incentives, guidelines and the positive perception associated with sustainable public procurement.

This factor was the only one that included a variable with a significant negative value, variable V11: “the perception that more sustainable products are associated with less quality (example: the use of recycled material, reuse, etc.)”. One interpretation for this negative variable within the context of Factor 2 would be that the greater the perception that sustainable products have poorer quality, the greater the need for incentives to develop sustainable procurement.

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Table 8 shows Factor 3, which groups the variables related to aspects of an economic nature. Gan (2014) defines economic uncertainty as uncertainty with regard to future economic events. Therefore, the prediction of a negative relationship between the resources available and the value attributed to more sustainable items defines a common point between the variables of this factor.

The variables involved in this factor, despite not having larger loadings, are those that apparently form barriers to sustainable public procurement in a more homogeneous way. Generally, the financial dimension of environmental management is the common aspect between the variables of this factor; not only the cost involved in acquiring sustainable items, such as variables V1 and V7, but also the lack of financial resources directly (V4) or indirectly (V18) caused by the political cycle.

Although instability caused by the political cycle (V18) may seem to be unrelated to the financial dimension, it represents a potential change in priorities, which can affect investment preferences, thereby making resources unavailable for certain areas. Similarly, the perception that sustainable procurement threatens or competes with other initiatives (V20) makes sense if one assumes that spending on public purchases is greater when it involves sustainable items, which is the basis of the composition of the group.

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Table 9 shows the composition of Factor 4; whose variables have in common the belief that market aspects are barriers to public procurement. The term “market” is used as in Mosgaard *et al.* (2013), who use the term in a specific sense when referring to a set of trade relations for a given type of product. Therefore, “Market Aspects” refers to the variables that have to do with the supply of products that are part of a set of particular trade relations, specifically in sustainable goods.

Factor 4 contains only 2 variables, both of which refer to the non-existence (or ignorance of the existence) of suppliers of more sustainable items (V12) and the lack of more sustainable inputs and items available for purchase in the market (V16). Both variables relate specifically to concern regarding the availability of sustainable items in the market.

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Table 10 shows the variables that go to make up Factor 5. The common characteristic of the variables in this group is that they act as barriers to the implementation of initiatives in sustainable public procurement. The two variables cited present problems that are faced by procurement sector employees in the tangible and operational dimensions of sustainable procurement management. While the first deals with the lack of time professionals have for involvement in sustainable public procurement, the second variable deals specifically with the lack of training for managing contracts involving sustainability in public procurement.

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4.4. Kruskal-Wallis Test

The Kruskal-Wallis Test yielded significant results ($p>0.05$) for some of the control variables described in Table 1, which arranges differences according to the following control variables:

• org 1 - Respondents from federal organisations (3) agreed that the lack of support from senior management (V10) is a barrier to sustainable public procurement less than respondents from sub-national organisations did (3.677).

• org 1 - Federal organisations see shortcomings in attitudes and organisational culture

(V8) to be less of a barrier to sustainable public procurement (3.435) than sub-national organisations do (3.903).

• pos 1 - Respondents in operational-level positions see the perception that sustainable procurement implies a high cost/price (V7) as being a more significant barrier (3.607) to sustainable procurement than planning occupants do (3,316).

• pos 1 - The significance of the variable V20p is <0.05. Professionals in planning positions have a greater perception (2.632) that competition for investment in with other social initiatives and projects (V20) is a barrier to sustainable public procurement than professionals in operational positions do (2.036).

5. Discussion: implications for theory and practice

The two variables that respondents most agreed were barriers to sustainable public procurement (V5, V6) fell within the same factor, "Aspects of Organisational Culture." However, although they were grouped within the same factor, Spearman's analysis of correlation coefficients showed no significant correlation between them.

Although the disarticulation between public sector spheres in planning, organising, directing and controlling sustainable purchases (V5) and the existence of conflicts between purchasing process priorities (V6) are not correlated, both variables correlate with the lack of attitudes and organisational culture for supporting and strengthening sustainable purchasing (V8), which indicates the potential transversal character of the V8 barrier.

The literature offers a perspective on the above analysis into the relationship between variables V5, V6 and V8. The work of Preuss and Walker (2011) supports the argument that organisational culture influences the willingness of employees to engage in sustainable public procurement, which is a prerequisite for substantial change.

Therefore, shortcomings in attitudes and organisational culture (V8) will improve to the extent that leaders or senior management attribute greater significance to actions in sustainability and minimise the perception that exists of a disarticulation between public

spheres (V5) and conflicts between priorities (V6).

Organisational culture, then, is a potential mediator between variables that refer to employees' perceptions of priorities and the actions of senior management. Shortcomings in attitude and organisational culture (V8) correlate with other cultural or organisational structure variables, in addition to support from senior management, thus confirming the analysis. This is in line with the findings of Roman (2017), Islam *et al.* (2017), and Brammer and Walker (2011).

In addition, both V9, "the lack of a long-term vision in the organisation that is compatible with the investment in sustainability" and V2, "the lack of employee awareness with regard to sustainable public procurement" correlate with V8, underlining its transversal character, and providing cohesion to the Aspects of Organisational Culture factor. However, this analysis points to the need for specific studies on cultural barriers to sustainable public procurement, as Witjes and Lozano (2016) have already noted.

The Motivational Aspects category provides a negative loading of the variable concerning the perception that more sustainable products are associated with poorer quality (V11). This variable relates to Kaufman's (2014) observations on certain groups stigmatising sustainable products as being inferior. The negative correlation of this variable within this factor implies that the greater the barrier caused by the association of sustainable products with poorer quality (V11), the less it is perceived that other motivational issues constitute a barrier.

Generally, the perception that more sustainable products are associated with poorer quality (V11) correlates with two of the variables dealing with economic uncertainty; specifically, the perception that investment in environmental purchases can compete with the adoption of other initiatives (V20) and the lack of financial resources and budget for making sustainable purchases feasible (V4). This relationship between the variables may suggest that the more respondents perceive sustainable items as being of inferior quality, the greater the perception that such purchases lead to a loss of efficiency in the application of limited public resources.

This research does not confirm that procurement costs and budget constraints are critical

barriers to the advancement of sustainable public procurement initiatives (Zhu, Geng & Sarkis, 2013; Brammer & Walker, 2011; Walker & Brammer, 2009). One possible explanation is that the companies studied are aligned with the government guidelines for A3P, which implies that organisations operating in an environment governed by ecological modernisation principles are able to reconcile economic and environmental development.

The Kruskal-Wallis tests indicated differences in the position of the respondents with regard to the type of organisation to which they belonged and to the type of role held. In general, respondents from federal agencies see fewer problems with regard to organisational culture and senior management support. One possible explanation for this result is that, since federal agencies are closer to senior management, communication is better, which favours them when it comes to more easily dealing with any lack of support. In fact, federal agencies may actually receive more support, leading them to perceive this variable as less of a barrier.

Professionals involved in planning activities tend to perceive the cost of sustainable items as less of a barrier, while more frequently perceiving the competition that exists between the acquisition of sustainable items and other activities. This may be explained by the fact that planning professionals are concerned with the availability of resources. As a result they may have greater knowledge of or access to resources than the occupants of operational positions. This result is consistent with the study by Lodgaard *et al.* (2016), which presented results in which workers—unlike senior management—tend to attribute the reasons for success to the commitment of senior management, rather than to the tools and methods that have been implemented.

6. Conclusions

Existing literature on the subject of barriers to sustainable public procurement has highlighted that: (a) acquisition costs and budget constraints have been indicated as critical barriers to the advancement of sustainable public procurement initiatives (Zhu, Geng & Sarkis, 2013; Brammer & Walker, 2011; Walker & Brammer, 2009), and that (b) support, attitude, organisational culture, and leadership styles have also been factors

deterring sustainable public procurement (Roman, 2017; Islam *et al.,* 2017; Brammer & Walker, 2011). This research did not confirm item (a), but did confirm item (b).

One possible explanation for the non-confirmation of item (a) is that the companies studied are aligned with the government's A3P guidelines, implying that organisations operating in an environment governed by the principles of ecological modernisation are able to reconcile economic and environmental development. This result indicates an important theoretical contribution of this research in relating the subject of sustainable public procurement to the theory of ecological modernisation.

Variable 8, "the lack of attitudes and an organisational culture for supporting and strengthening sustainable procurement", proved key to understanding the main barriers detected by this research: disarticulation between public sector spheres in planning, organising, directing and controlling sustainable procurement (V5), and the existence of conflicts between priorities in the purchasing process (V6). In this sense, organisational culture is a potential mediator between variables related to employees' perceptions of the priorities and actions of top management.

The research successfully addressed the gap it proposed, and additionally offered a new state-of-the-art view by indicating the main barriers to sustainable public procurement, especially in the Brazilian context, with the variables already validated by the literature. The practical implication for public administration professionals is the need to develop sustainable procurement management tools that involve better co-ordination of public spheres and intervention in organisational culture based on the actions of senior management.

Among the limitations of this study we can point out the relatively low number of respondents for factor analysis. As a result, and associated with the large number of variables involved, some variables had low commonality values. Moreover, the heterogeneity of the respondents and the population also prevented further analyses on possible response patterns related to the time taken by respondents to return the questionnaire, in addition to patterns related to other characteristics.

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