Competences for Organizational Sustainability: A Proposal for an Analytical Tool for Assessing Eco-Efficiency

Luciano Munck¹, Bárbara Galleli Dias² and Rafael Borim-de-Souza³

Abstract
The fact that organizations are able to structure their competences into a specific management model is only the starting point for developing a strategic plan geared towards sustainability. We developed this primarily theoretical research with the objective of elaborating and proposing an analytical tool capable of ascertaining organizations’ levels of eco-efficiency, based upon evaluation of how well they deliver supportive competences that foster eco-efficiency. The analytical tool used organizational competences to assess eco-efficiency, as was originally proposed by the World Business Council for Sustainable Development.

Key words: Eco-efficiency, Sustainability, Organizational Competence

INTRODUCTION
Sustainable development is an undeniably multidisciplinary phenomenon (Mebratu, 1998). Since this is an inherent characteristic, research seeking to explore and explain it cannot ignore the contributions of applied social sciences, specifically in Management, when it comes to how organizational behavior engages with stakeholders interested in enabling sustainable development (Gladwin, Kennelly, and Krause, 1995). This behavior has been labeled as organizational sustainability, and in effect is responsible for inserting sustainable development into all of an organization’s strategies and decisions (van Marrewijk, 2003).

In order to be managed together with an organization’s daily life, organizations need a management tool that endows the ability to measure, evaluate and especially enhance organizational sustainability (Kaptein & Wempe, 2002). From among the managerial tools that are currently used in management practices, competences stand out in this regard (Maggi, 2006). Inherent to discussions concerning sustainable development is the idea of eco-efficiency. Being efficient is a priority for any organization, but if realizing greater economic value can simultaneously result in mechanisms which rely on more responsible resources and also reduce overall impacts on the environment, a company will seek to achieve eco-efficiency (Bleischwitz, 2003). Eco-efficiency is an integral part of any movement towards organizational sustainability (Savitz & Weber, 2007).

We developed this article within such a context, with the objective of developing an analytical tool to evaluate organizational eco-efficiency and allow for identifying how eco-efficient an organization is by assessing how well they deliver supportive competences that foster eco-efficiency. Another desired result of the research is to explicitly describe the relationships between competences, organizational sustainability and eco-efficiency, in order to identify the competences that make eco-efficiency viable.

We examined the abstracts of articles that included the key terms sustainability, sustainable development, eco-efficiency and/or competences, and published in journals ranked as of 2009 by CAPES (the Brazilian higher education authority) as A1 or A2, meaning journals international in scope and quality, in the areas of Management, Accounting, and Tourism. Of all of the journals falling within this category, 59 were analyzed as far back as their initial publishing dates. 79 articles were encountered that had some mention of sustainability, sustainable development, and/or eco-efficiency. 59 also had “competences” somewhere in the title. None of the article encountered had content similar to the general objectives of this present article.

To enable a better understanding of the theme of this investigation, this article was developed and organized into the following sections: introduction; methodology; considerations about organizational sustainability; principles of eco-efficiency; organizational competences; the relationships between...

¹ Universidade Estadual de Londrina, email: munck@uel.br
² Universidade Estadual de Londrina, email: b.gallelidias@gmail.com
³ Universidade Federal do Paraná, email: rafaborim@yahoo.com

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competences, organizational sustainability, and eco-efficiency; an analytical tool for assessing how competences make eco-efficiency viable; and final considerations, including suggestions for future research and implications for Management studies.

METHODOLOGY
As stated before, the objective of this article is to develop an analytical tool for assessing organizational eco-efficiency by evaluating how well companies deliver supportive competences that contribute to eco-efficiency. Essentially, this tool is intended to identify how eco-efficient any given organization is. Due to this nature, the research methodology is characterized as theoretical, qualitative, exploratory, and bibliographical (Demo, 2000). Even though the article itself is theoretical, the development of said analytical tool can allow for future empirical investigations of various organizational realities. Table 1 elaborates on the primary themes covered in this article.

Insert table 1 here

CONSIDERATIONS ABOUT ORGANIZATIONAL SUSTAINABILITY
Starting from an organizational focus on sustainable development, Silva and Quelhas (2006) described organizational sustainability as a search for equilibrium between what is socially desirable, economically viable and ecologically sustainable. According to Savitz and Weber (2007), a company is sustainable when it generates profits for shareholders, protects the environment, and improves the lives of the people with whom it interacts. Dyllick and Hockerts (2002) defined organizational sustainability as the capacity companies have for leveraging their economic, social and environmental capital for contributing towards sustainable development within their political domain.

Munck and Borim-de-Souza (2009) argued that sustainable organizational actions are those responsible for causing the least environmental impact possible due to operational activities, while simultaneously paying attention to socio-economic development that will enable the survival of present and future generations. Such development, according to the authors, should occur in a manner completely dependent upon the people inserted within organizational and societal environments, because they are those ultimately responsible for the final decisions and validation of all such propositions. By considering that in order to enact their activities, companies consume not only financial resources, but also social and environmental ones, Elkington (1999) proposed a relationship between the three pillars of sustainability (social, economic, and environmental), known in the literature as the Triple Bottom Line (TBL). This has become a perspective that is ever more accepted by society and organizations. It is worth reinforcing the idea, as in Dyllick and Hockerts (2002), that these three elements have different properties and therefore require different approaches.

Dyllick and Hockerts (2002), in an attempt to match sustainability with corporate requirements, affirmed that researchers in this area seek to discover how organizations can promote economic sustainability at the same time as they increase their social and environmental efficiency. In order for a company to truly become sustainable, it is necessary for it to integrate the economic, social and environmental pillars that compose organizational sustainability. This triple vision is the foundation for this current research, and ensures that economic development, environmental quality and social justice are all equally relevant for understanding sustainability.

As found in Lorenzetti, Cruz and Ricioli (2008) the economic pillar refers to organizations’ impacts on the economic conditions of stakeholders, as well as the economic system, at all levels. In other words, it represents the generation of wealth by and for society, by supplying goods and services. According to Azapagic (2003), a venture’s economic viability is the central part of sustainable development, because only profits result in job growth, which in turn enables a community the possibility of improving living conditions. In a more direct approach, Dyllick and Hockerts (2002) assure that an organization’s economic sustainability indicates that it has the capacity to realize its activities in a way that is both responsible and that results in considerable profits.

The environmental pillar refers to the conservation and management of natural resources. It is necessary that a company, by scrutinizing how its operations and products affect both living and inanimate natural systems, should seek to minimize negative and amplify positive impacts, in both inputs and outputs (Kranjc & Clavic, 2005). Responsibility for the natural environment goes beyond legal requirements or
generic initiatives, such as recycling or the efficient use of energy resources. It involves, from the very beginning, a comprehensive approach towards organizational operations (Jamali, 2006).

The social pillar, according to Lorenzetti, Cruz and Ricioli (2008), concerns itself with the quest for equality and participation of all social groups in the construction and maintenance of a system’s equilibrium; sharing the rights along with the responsibilities. For companies, this dimension refers to their impact on the social system(s) where they operate: social performance is approached by analyzing the stakeholders at the local, national and global levels. Kranjc and Clavic (2005) stated that social sustainability in regards to organizations refers to corporate attitudes relating to employees, suppliers, contractors, consumers, and general impacts on the society beyond their own corporate domains.

The three pillars of organizational sustainability (social, environmental, and economic) should combine in an integrated manner in order to achieve sustainable development (Callado, 2010). In this way, it is possible to infer that a balanced vision with respect to how to use natural resources is essential to guaranteeing that future generations inherit a prosperous and just society, better environmental conditions and improved quality of life.

This integrated relationship can be seen as a fusion of the questions that emerge, in the beginning, from the connection established between two consecutive variables. The social question is combined with environmental concerns through the need for socio-economic performance capable of being supported by nature, society and the economic system. Environmental principles merge with the economic pillar for investments interested in promoting societal growth through activities compatible with nature and the economy. The economic system joins with the social when investments and economic operations are analyzed part and parcel with their possible societal consequences; in other words, once the social and economic reach the same level of analytical relevance, corporate profits are legitimately gained through organizational activities based upon sustainable principles (Munck & Souza, 2009b). Figure 1 represents this idea.

According to Elkington (1999) and Savitz and Weber (2007), based upon the integration between the economic and social pillars, there is social inclusion. This is understood as engaging the population (or organization) towards the collective welfare, in a way that everyone can have access to information, food, healthcare, education, housing, employment, income and dignity. The concept of eco-efficiency emerges from the extent to which there is an interrelation between the economic and environmental pillars: this will be discussed further in the next section. Furthermore, socio-environmental justice occurs when an organization manages to simultaneously integrate the social pillar with the environmental pillar, and moves on to focus on equalizing the distribution of benefits and constraints imposed by environmental legislation, or even environmental problems, among different social groups (Elkington, 1999; Savitz & Weber, 2007). As referenced before, the integration of the three pillars of organizational sustainability is the crucial factor for achieving sustainable development in organizations.

Oliveira (2002) believes that the consolidation of the TBL proposal, the questioning and rethinking of the management of organizational responses and actions comes to be seen, in a certain way, as a social and environmental function of the organization as a member of a system integrated within society. Questions such as the mission, strategies, beliefs, reasons, and values that will be developed over the long-term, and determination of the organizational domain, all play a role in this rethinking. Savitz and Weber (2007) further assert that the TBL structure captures the essence of organizational sustainability, by measuring a company’s operational activities impacts. When the result is seen as positive, it can increase the company value, in terms of profits and contribution to shareholder wealth, as well as for the company’s social, human and environmental capital.

The key is that the sustainability pillars must be developed in an equitable, or at least optimize, way. Thus, a company will gain the possibility of acting in tandem with the principles of eco-efficiency, social insertion and socio-environmental justice; all concepts which are tangible, measurable, and closer to organizational reality. Next, as it is the focus of this research, we will cover the important aspects concerning the principles of eco-efficiency.
PRINCIPLES OF ECO-EFFICIENCY

Regardless of the motivation for pursuing sustainable management, it seems to be an inexorable tendency in organizations. As such, Bleischwitz (2003) proposed a discussion of a management model that takes into account other factors, labeled in economics as positive and negative externalities. In this context, academic literature investigates the relationships between financial and environmental performance, which are seen as the fundamentals of eco-efficiency.

Despite being well designed, Huppes and Ishikawa (2005) asserted that the “eco-efficiency issue” shows to be highly diverse, or rich in attributes, when seen from the positive side. For the authors, eco-efficiency can be summarized in a mechanism for the revision of sustainability, since it indicates an empirical relationship between economic activities and both environmental costs/values and ecological impacts. In a broader manner, the World Business Council for Sustainable Development – WBCSD – (2000) mentions that eco-efficiency can be reached by supplying goods and/or services at competitive prices, that not only satisfy consumer needs, but at the same time improve their quality of life and reduce environmental impacts and resource consumption. In this same vein, Piotto (2003) discussed how eco-efficiency is having the knowledge to combine economic and environmental performance, while reducing environmental impacts at the same time. It provides for a more rational use of raw materials and energy, reduces the risks of accidents, and improves relationships with stakeholders.

The most broadly accepted criteria for achieving organizational sustainability is found through efficiently managing a company’s natural capital. Eco-efficiency is normally calculated as the economic value added by a company in relation to its environmental impact. Therefore, eco-efficiency is seen as being reached through the deliverance of products at competitive prices and services that satisfy human needs and progressively reduce ecological impacts (Dyllick and Hockerts, 2002).

According to Salgado (2004), the insertion of eco-efficient practices guides a company towards having a competitive advantage over its competitors. For this to occur, there are three fundamental principles that need to be applied: 1) a reduction in natural resource consumption, such as energy, materials, water and land; 2) a reduction of impacts on nature, which is understood as lowering levels of air and water pollution; 3) an increase in the productivity or value of a product or service. The author stressed that for an organization to accomplish these principles, definite actions should be established in all departments and throughout the entire supply chain.

Sisinno and Moreira (2005) further allege that there are various advantages, both tangible and intangible, to be gained by adopting eco-efficiency. These include: minimization of environmental damages, which inherently reduce subsequent risks and responsibilities; promotion of optimal conditions for job health and safety; improvement of efficiency and competitiveness, which support innovation; enhancing an organization’s reputation and relationships with environmental agencies and the community, among others. Salgado (2004) points out that once executives realize that implementing eco-efficient practices not only reduces environmental impacts but also adds value to the production process, such practices come to be more utilized and incorporated into organizations. For this evolution important to the environmental question to occur, organizational decisions must be aligned with sustainable principles. It must be advised that an isolated attempt at establishing eco-efficiency does not result in sustainability. Furthermore, it is not uncommon for organizations to use actions labeled as eco-efficient simply as a marketing ploy. It should be recognized that TBL constitutes an approach that is not detached, but is one of the few approaches that manages to be present in organizational contexts, due to its inherent complexity. Beyond broaching the subject of the three sustainability pillars, TBL proposes that their operationalization be both simultaneous and interactive (Elkington, 1999; van Bellen, 2008; Dillick and Hockerts, 2002; Huppes and Ishikawa, 2005; Young and Tilley, 2006).

ORGANIZATIONAL COMPETENCES

Fleury and Fleury (2006) argued that when associated with the work environment, the concept of competence assumes facets that are as often individual as collective or even organizational. Similarly, Bitencourt (2005) claims that when competences are analyzed under the individual prism, they reflect upon the development and training of personnel. However, when they are studied under an
organizational lens they give insight into a company’s conceptual aspects: strategy, business and competitiveness.

Dutra (2001) also adds deliverance as a dimension of competence; as in what a person can and wants to deliver to an organization. According to the author, the fact that a person possesses a set of knowledge, abilities, and attitudes, does not imply that an organization will necessarily benefit directly from them. The idea of “deliverance” indicates this benefit. This concept is worthy of attention, and we included it in the development of the proposed analytical tool.

Mills, et al. (2002) considered that competence is a way of describing how well, or how poorly, an organization performs its necessary activities, and thus, can represent any improvement in activities, the evaluation and use of available resources, and the acquisition and use of new resources before competitors. The authors believe that organizational competence is best seen as a variable, rather than an attribute. In other words, it is not something that a company does or does not possess, but something that it has at a certain level compared to competitors. It is also possible to characterize organizational competence, or as stated by Maggi (2006) “organizational competence”, as the refinement of the organization as an entity in and of itself.

The level of competence presented by corporate activity depends upon six determining factors: 1) the wealth of available resources; 2) appropriation of these resources for a given activity; 3) the way that these resources are assessed and managed; 4) the frequency of the activity; 5) the performance of supportive competences; 6) the priority given to the activity, primarily when any resources utilized are shared (Mills, et al., 2002). However, before being able to define an organization’s level of competences, it is essential to understand how to treat, manage, and develop them in order to obtain value from them. There are five categories of organizational competences according to Mills, et al. (2002), as seen in Table 2.

RELATIONSHIPS BETWEEN COMPETENCES, ORGANIZATIONAL SUSTAINABILITY, AND ECO-EFFICIENCY

In an environment full of strategic actions, competences represent the concepts that explain companies’ competitive contents. Competences add a unique value for company clients and are defined by changes
demanded by companies’ strategic actions according to the products they provide and markets they participate in. The quest to identify competitive advantage encourages an organization to position itself comparatively ahead of competitors. A company’s sustainable competitive advantage originates in the set of abilities, experiences, innovative capacities, knowledge, market acumen, and available and accessible information that rationally combine to comprise organizational competences (Munck, 2005). Thus any description of competences focuses on an organization, and the structuring of competences using a model can be a starting point for the development of strategic plans that align with organizational needs, market concerns and personal perspectives.

Borim-de-Souza (2010) proposed an alignment between the concepts of competences and sustainable development. As such, while competences offer the capability to generate organizational sustainability and sustainable development, the alignment connects organizational knowledge of competences with the economic, social and environmental concerns that an organization experiences; a process that is constantly reinforces the relationship. The objective is that such a relationship can achieve organizational competence in organizational sustainability at the beginning, while later accomplishing a meta-competence of sustainable development. This second stage is influenced by the occurrence and practice of both unique and core competences. This reasoning is displayed in Figure 2.

Insert figure 2 here

Given the reasoning shown, it is necessary that an organization first develop eco-efficiency, environmental justice and social insertion as core competences. These then culminate in the formation of unique organizational competences: “economic sustainability”, “environmental sustainability”, and “social sustainability”. According to the author, if fully developed, such unique competences allow the realization of organizational competence in organizational sustainability. In essence, the three organizational sustainabilities are considered distinctive competences because they are fundamental company activities, recognized by clients as unique, and thus allow competitive advantage. The author further affirms that competence in organizational sustainability is also a dynamic capacity, due to the fact that the organization needs to demonstrate the capability for adapting and renewing its competences over time. In this manner, sustainable development is understood as a meta-competence that stems from having organizational competence in achieving organizational sustainability (Borim-de-Souza, 2010).

Management by competences can be understood as a response to social expectations of organizational actions aimed at sustainability. To connect and unify individuals with companies, management by competences proffers a supportive environment for discussing organizational problems; as much those related to economic responsibilities as socio-environmental.

It should be understood that this definition closely approximates what has already been said about managing competences in organizations. It has been shown that efficiently managing competences allows for improvements in strategy design and development. Models adopted for managing competences should seek to develop individuals as both professionals and individuals, as such changes are mirrored in at the group level and as a consequence help exploit and perfect an organization’s competitive advantage.

Based upon Elkington’s (1999) contributions for TBL structure, Savitz and Weber’s (2007) work on the fusion of the pillars, and Mills, et al. (2002), development of organizational competence categories, it has been considered that organizational competence for a “capability for developing sustainably” is composed of the three organizational core competences previously mentioned: social insertion, socio-environmental justice, and eco-efficiency. Worth remembering is that such competences are the result of specific integration between the social, economic, and environmental pillars.

The focus of this research is on competence in eco-efficiency, due to the fact that organizations must concurrently meet the growth in demand by an ever more global consumer population as well as achieving a just ecological quality (Huppes & Ishikawa, 2005). Beyond this, Lorenzetti, Cruz and Riciolli (2008) argued that given the importance shown environmental topics by governments and organizations around the world, activities that are eco-efficient garner the highest levels of consensus and implementation.

As grounded in the WBCSD (2000) principles, when considering the close relationship between sustainability and economy, it is possible to emphasize seven dimensions of eco-efficiency that are
applicable for all companies that provide products and services, modify processes or any other action that has an association with the natural environment. They are: 1) reduce the intensity of material consumption in products and services; 2) reduce the intensity of water and energy consumption in products and services; 3) reduce the dispersion of toxic compounds; 4) promote recycling; 5) maximize the usage of renewable resources; 6) extend the durability of products; 7) enhance the functionality of product and service usage (i.e. increase the number of ways that the products and services can be used. In this way, if it is assumed that the products and services supplied will allow economic development, they will be more efficient from an environmental point of view if they use these seven dimensions of eco-efficiency together, which are inevitably more effective than using them separately (WBCSD, 2000). These elements further show in a clear way that eco-efficiency is not limited to incremental changes in the use of resources. By including elements such as product durability or service intensity, the concept comes to provide a redefinition of a product or even how to do business. We emphasize that these dimensions should occur simultaneously for eco-efficiency to be effective.

For the purposes of this research, these seven eco-efficiency dimensions are understood as supportive competences that must be developed by an organization, in order to achieve eco-efficiency. We restate here that these dimensions are competences that specifically support competence focused on organizational eco-efficiency, from their intrinsic nature of fostering the development of other company activities. As such, Table 3 describes each of these supportive competences and their respective objectives.

Insert table 3 here

The optimization in consumption of materials in products and services and in water and energy has the target of reducing the consumption of materials in production activities. For this reduction to occur, it needs to be understood that work processes will be affected at the same time and thus require a deeper understanding, in that there will be changes in the inputs and outputs. Thus, it is justifiable to categorize it as a supportive competence. By diminishing environmental impacts through the reduction in the amount of material inputs (natural resources, water and energy) per unit of production (i.e. optimization), it is possible to achieve cost reductions and productive gains (WBCSD, 2000). Minimization in the dispersal of toxic compounds and maximization in the usage of renewable resources is primarily aimed at reusing and revaluing sub-products and residuals, hoping to achieve zero waste. Such competences are considered supportive, in that they refer to a specific objective and work, both of which require the application of detailed knowledge for effectiveness. They also have the possibility of enabling other productive activities, such as thorough maintenance and management of residuals. An increase in the intensity of product and service usage (enhanced functionality) is an extension of product durability (increasing the product life cycle), beyond fostering internal organizational activities, can affect the behavior of final consumers by altering their perceptions. Such a depiction is based upon the argument developed by Savitz and Weber (2003): by offering better products, that are environmentally acceptable, with improved functionality, a company achieves greater rentability and market share. This results in a greater competitive advantage.

Finally, promoting recycling is classified as a supportive competence, especially for internal recycling (within the organization, targeting production). However, external recycling should not be discounted; such as the promotion of recycling aimed at consumers, like returnable packages. According to Forlim and Faria (2002), recycling can be understood as the implementation of processes and techniques designed to optimize the use of energy, raw materials, products and materials employed in the production of both goods and services. The very concept of recycling requires a change in production chains, and thus development of a supportive competence within the organization.

It is extremely important to highlight that each objective of the competences supportive of eco-efficiency should have pre-established parameters, based upon each organization’s reality. That is, the reduction, intensification or maximization of any such activities that promote or develop these competences will vary depending upon the current state of the company. Having finished the overview of eco-efficiency, the next section will present the analytical tool that can help identify the level of eco-efficiency within any given organization.
ANALYTICAL TOOL FOR COMPETENCES ENABLING Viable ECO-EFFICIENCY

Siena’s (2008) perspective is that the manifestation of concept of sustainable development is a complex problem, in that its conceptual bases for related questions are not consolidated. Nevertheless, regardless of the convolutions in how the theme is viewed, it is a fact that sustainable development is a fundamental question in governmental policies. For this reason, it is constantly more important to identify the set of indicators that enable it to be evaluated.

As presented, eco-efficiency consists of competences supportive of sustainable development, and therefore it is essential to have an instrument capable of measuring it. Salgado (2004) said that because eco-efficiency is related to a company’s competitive strategy and the sustainable development, the concept of eco-efficiency itself provides a definition of indicators capable of measuring a venture’s development.

Many organizations have already adopted programs and projects geared at standardizing environmental reporting and measurements of eco-efficiency; some of which are applied to a large variety of businesses, and others only used within specific sectors. However, Jung, Kim, and Rhee (2001) indicate that the existing ways of measuring environmental performance, as found in most research thus far, are conflicting, confusing and conceptually arbitrary in assessing environmental performance. Hence, such methodological inconsistencies in evaluating and measuring can inhibit research in the area and limit direct comparison between companies within the same sector. Siena (2008, p. 359) contributed to this sentiment and further declared that “there is not a consensus as to how to measure, what to measure, and primarily, how to weigh and combine data”.

Considering all of these deliberations, it is possible to see that various studies argue in favor of developing such measurement instruments, while at the same time warning about the lack of consensus they have caused. More so, existing research covers sustainability and not eco-efficiency, and publications about its relationship with competence management are nowhere to be found, as previously stated. For this reason, please understand that the instrument developed in this research is intended to be a concrete taxonomy for measuring the state of a company’s eco-efficiency, starting with its level of being able to deliver competences that enable and make eco-efficiency viable.

The analytical tool proposed will be named CE7, and was generated using considerations with a six-point Likert scale, in accordance with the deliverance level (Dutra, 2001) a company has for each competence supportive of eco-efficiency. The lowest level is 0 (zero), with the highest being 100: 0 (zero) signifies the absence of any delivery; 20 denotes that there is insufficient delivery; 40 means weak delivery; 60 refers to average delivery; 80 signifies good delivery; 100 reflects the optimal delivery a company can have towards reaching its objective, and thus developing the respective competence. Table 4 displays our reasoning.

Insert table 4 here

This framework, at least for the purposes of this research, should be filled in by the managers responsible for the areas of sustainability and personnel management at a given company. Each competence enabling the viability of eco-efficiency should only receive one level of delivery. This framework is just one stage in the use of our analytical tool for assessing eco-efficiency.

Siena (2008), in proposing a measurement scale for sustainable development, used a system of bands. Through this author’s work and adaptations of this current research’s findings, the CE7 taxonomy is capable of showing at what level of eco-efficiency development a company stands, as shown in figure 3. Between 0-20, the company is not in an eco-efficient state. From 21-40 the organization is considered mostly not eco-efficient. At the 41-60 level a company is at an intermediate state. Between 61-80, the company is mostly eco-efficient. Finally, a level of 81-100 finds a company at a complete state of developing competence in organizational eco-efficiency.

Note that the maximum points allowed by the framework are 700; seven competences each with a 100 point limit. On top of this aggregation, the representativeness, in percentages, of each general delivery level a company has for the proposed eco-efficient competences, will enable a more specific determination of the organizational eco-efficiency, as shown in Figure 3. The idea of general delivery is used due to the theoretical propositions already presented in this paper that suggest in order for a company to be eco-efficient, it should simultaneously develop all of the indicated supportive
competences (WBCSD, 2000; Mills, et al., 2002). A lack of delivery was not considered, because such a state would always have zero points, which indicates that the state of development is not eco-efficient, no matter the situation.

**Insert figure 3 here**

By interpreting the CE7 taxonomy, it is possible to see the coherence between the competences supportive of eco-efficiency, as proposed here, and the level of progress in which an organization exists. For example, if the general delivery of supportive competences is 46%, or a regular delivery, the state of development of eco-efficient competence for the company will be intermediate. In this way, for an organization to be considered truly in a state of eco-efficiency, it should have an index of at minimum 81% in delivering its supportive competences. Accordingly, the CE7 taxonomy developed here allows for the classification, from the respondent’s viewpoint, of the state of eco-efficiency a company is in based upon the existence or lack of competences supporting determined levels of delivery.

By having such information, a company will have at its disposal a useful analytical tool, one that it can use to generate conclusions regarding its environmental and economic behavior. This can allow for changes in procedures and postures that may be deemed necessary. It is also essential to emphasize that the CE7 taxonomy should confer analysis based upon the judgment of professionals from the area being studied, so that they can be alert for any possibility of subjective bias.

**FINAL CONSIDERATIONS, SUGGESTIONS FOR FUTURE RESEARCH, AND IMPLICATIONS FOR MANAGEMENT**

This research was aimed at proposing a tool for measuring organizational eco-efficiency starting with an understanding of the connections between organizational sustainability and competences. In order to achieve this objective, it was necessary to verify the relationship between competences and sustainability, as well as identify which competences enable and make eco-efficiency viable. Then we were able to develop a framework for analyzing the delivery process for competences and supportive competences of eco-efficiency.

After an extensive literature review, we arrived at the understanding that sustainable development is a meta-competence to be achieved; among its diverse sustainabilities exists organizational sustainability. This, in turn, is supported by three pillars, competences unique to each organization: economic, social, and environmental. When observed under the TBL lens, three competences come into focus: social insertion is achieved through the union of the economic and social pillars; socio-environmental justice is obtained by combining the social and environmental pillars; and eco-efficiency is composed of a merger between the economic and environmental pillars. As building blocks for conjecture, these three core competences are fundamental to accomplishing sustainable development.

Throughout the work, competence based management was understood to be a way for comprehending and integrating a network that allows an organization to respond to social expectations for sustainability, through eco-efficiency.

The main priority of this research was to deepen the understanding of aspects concerning eco-efficiency as it relates to organizational sustainability; however, the intent was never to disregard social insertion or socio-environmental justice. Therefore, we included seven supportive competences that help develop and achieve eco-efficiency, which should be taken together and addressed concurrently by an organization. Based upon theoretical proposals, the next step was the construction of an analytical tool for assessing the state of eco-efficiency for organizations. The level in which they can be found depends upon the vision of the managers with respect to how the organization delivers competences supportive of eco-efficiency. When a manager’s perspective is more positive, the company’s level of eco-efficiency will also be higher, and vice-versa.

We also would like to make suggestions for applying this research, as a further stage of its development. It offers empirical contributions that can help bring important contributions to managers as a tool for guidance and analysis in their quest for improved eco-efficient practices. Furthermore, field research can bring new academic contributions by helping suggest new applications, corrections and extensions to this study, as well as guiding and grounding new research.

In fact, the operationalization of this study will also perpetuate opportunities for new questions related to the theme. We hope that empirical studies can integrate new concepts capable of responding to and
shedding light on current questions and other unknowns, such as: What is the best way to guide the development of competences with enable and make viable eco-efficiency for sustainable development? Which are the most important competences for meeting expectations of sustainable development? These are not only justified, but necessary studies. We also suggest that studies seek to deepen the understanding of the relationships between competences and sustainable development. As we said earlier, research in this area is scarce, but the field of study is vast. Research can also be undertaken at the micro or macro levels, focusing on individual, collective or organizational competences; or covering social insertion, socio-environmental justice, or eco-efficiency, or all three at the same time.

In conclusion, by constructing responses which better explain the proposed relationships, which up till now have been absent in scientific studies connected with Management, at the very least a debate can be established that will create new ways of addressing the questions under analysis.

REFERENCES


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<tr>
<th>Themes</th>
<th>What is studied?</th>
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<th>Procedures</th>
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<tr>
<td>Organizational Sustainability</td>
<td>Presentation of the concepts and characteristics which typify the sustainability of organizations.</td>
<td>Savitz, Weber (2007); Van Bellen (2004); Clapp (2005); Elkington (1999); Dyllick &amp; Hockerts (2002)</td>
<td>Bibliographical research</td>
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Organizational Competence | Conceptual aspects, characterizations, and classifications, with a focus on organizational competence. | Fleury & Fleury (2006); Mills et al. (2002). | Bibliographical research
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Relationships between Competences and Eco-efficiency | The importance of this connection and which competences enable viable eco-efficiency. | Mills et al. (2000); Fleury & Fleury (2008); WSBCD (2000); Souza (2010) | Bibliographical research

Table 1 - The research themes, topics, and procedures. Source: Elaborated by the authors

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![Elements of organizational sustainability](image1)

Figure 1 - Elements of organizational sustainability. Source: Adapted from Savitz and Weber (2007).

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<tr>
<th>Category</th>
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<td>Core competence</td>
<td>This refers to the most important activities a company has, which are essential to its survival and central to its strategy.</td>
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<tr>
<td>Unique competence</td>
<td>These are activities important to the company, recognized by clients as unique, and thus promote a competitive advantage.</td>
</tr>
<tr>
<td>Business unit competence</td>
<td>This refers to a lower number of activities which are developed by any given business unit within the company.</td>
</tr>
<tr>
<td>Supportive competence</td>
<td>This is any activity which is valuable because it promotes a series of further activities.</td>
</tr>
<tr>
<td>Dynamic capacity</td>
<td>This addresses how all well a company can adapt or leverage its competences and and/or activities over time.</td>
</tr>
</tbody>
</table>

Table 2 – Organizational competence categories. Source: adapted from Mills, et al. (2002).

---

![The alignment between sustainability and competences in an organizational context](image2)

Figure 2 – The alignment between sustainability and competences in an organizational context. Source: Adapted from BORIM-DE-SOUZA (2010, p.115).
<table>
<thead>
<tr>
<th>Supportive Competence</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimization of product and service material consumption.</td>
<td>Reduce the intensity of material consumption in products and services.</td>
</tr>
<tr>
<td>Optimization of water and energy consumption in products and services.</td>
<td>Reduce the intensity of water and energy consumption in products and services.</td>
</tr>
<tr>
<td>Minimization of the dispersal of toxic compounds.</td>
<td>Reduce the dispersal of toxic compounds.</td>
</tr>
<tr>
<td>Promotion of recycling.</td>
<td>Promote recycling both internally and externally at a company.</td>
</tr>
<tr>
<td>Maximization of renewable resource usage.</td>
<td>Maximize the use of renewable resources.</td>
</tr>
<tr>
<td>Extension of product durability.</td>
<td>Extend the durability of products.</td>
</tr>
<tr>
<td>Enhance product and service functionality.</td>
<td>Enhance the intensity of product and service usage.</td>
</tr>
</tbody>
</table>

Table 3 – Competences than enable viable eco-efficiency  
Source: Elaborated from research findings.

<table>
<thead>
<tr>
<th>Supportive Competence</th>
<th>Desired Deliverance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimization of product and service materials consumption</td>
<td>Reduction based upon pre-established standards for the intensity of material consumption for products and services</td>
</tr>
<tr>
<td>Optimization of water and energy usage in products and services</td>
<td>Reduction based upon pre-established standards for the intensity in water and energy consumption for products and services</td>
</tr>
<tr>
<td>Minimization of the dispersal of toxic compounds</td>
<td>Reduction based upon pre-established standards for the dispersal of toxic compounds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Absence of Delivery (0%)</th>
<th>Insufficient Delivery (up to 20% of desired)</th>
<th>Weak Delivery (between 21% &amp; 40% of desired)</th>
<th>Average Delivery (between 41% &amp; 60% of desired)</th>
<th>Good Delivery (between 61% &amp; 80% of desired)</th>
<th>Optimal Delivery (between 81% &amp; 100% of desired)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 points</td>
<td>20 points</td>
<td>40 points</td>
<td>60 points</td>
<td>80 points</td>
<td>100 points</td>
</tr>
</tbody>
</table>

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### Promotion of recycling
To promote and realize recycling in both the internal and external company environments.

### Maximization of the use of renewable resources
Maximize based upon pre-established standards for the use of renewable resources.

### Extension of product durability
Extension based upon pre-established standards for product durability.

### Enhancing product and service functionality
Enhance the product and service functionality based upon pre-established standards.

<table>
<thead>
<tr>
<th>Promotion of recycling</th>
<th>Maximization of the use of renewable resources</th>
<th>Extension of product durability</th>
<th>Enhancing product and service functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>To promote and realize recycling in both the internal and external company environments</td>
<td>Maximize based upon pre-established standards for the use of renewable resources</td>
<td>Extension based upon pre-established standards for product durability</td>
<td>Enhance the product and service functionality based upon pre-established standards</td>
</tr>
</tbody>
</table>

**Table 4: Framework for verifying competences supportive of eco-efficiency.** Source: Elaborated by the authors.

**Figure 3 – CE7 Taxonomy.** Source: Elaborated by the authors.