GREEN INFORMATION TECHNOLOGY IN ORGANIZATIONS:
A STRATEGIC VISION

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ABSTRACT

Context: The growth of Information Technology (IT) generates environmental impacts, benefits of Green IT practices, decreased environmental impacts, and Green IT in strategic planning.

Aim: Mapping the perception of IT experts, coordinators, and managers of green IT practices in organizations and their strategic positioning.

Design/Methodology/Assessment: A literature review was carried out, which based a field research applied to 97 managers and IT specialists from organizations, most of them from the state of Rio de Janeiro and São Paulo, from the most varied business branches, from December/2018 to January/2019. The data were analyzed through descriptive statistics and four cross-references of results on Green IT practices, strategic planning, and environmental goals.

Results: It was observed that less than half of the organizations do not treat Green IT as a strategic item, not including it in their strategic planning, in their environmental policy, and not creating environmental targets.

Practical Implications: This research is expected to contribute by demonstrating the importance of reducing environmental impacts, the benefits of Green IT practices, and offering new solutions to organizations.

Originality/value: Green IT is not treated strategically, which causes a counterpoint: IT is an indispensable area for the business and generates competitive advantage, but its environmental impacts are not treated strategically.

Descriptors: Green IT; Sustainability; Strategic planning; Environment.

1. INTRODUCTION

The evolution of the Information Technology (IT) area has become a strategic asset in a global and competitive market. The relationship that was of support area has passed to an almost indissoluble link and, in some moments, has transformed the business model (Oliveira *et al.,* 2012).

IT development came with a price to pay, with the environmental impact. Thus, new social values and ecologically correct products, called "green" products, have emerged, aimed at reducing environmental impacts in the development of products and services (Lunardi *et al.*, 2014).

The sustainability of operations emerges as a major concern for top management, institutional investors, and policymakers around the world. Managers are interested in sustainability because of their concerns in terms of environmental impact, implications for future profitability, and company reputation among stakeholders, such as environmentally conscious customers, employees, supply chain partners, and investors (Khuntia *et al.*, 2018).

In this need to value the environment, without harming the competitive advantage that comes from IT, Green IT emerges, and it is configured as practices for the intelligent application of IT, using energy efficiently and in an ecologically correct way, in order to reduce the environmental impacts throughout the organization (Salles *et al.*, 2013).

Green IT seeks to impact IT throughout its life cycle, in the manufacturing of equipment through the use of fewer toxic components in its intelligent use and, finally, in its correct disposal (Salles *et al.*, 2013).

Green IT has also been causing a re-engineering of IT products and services to increase efficiency and meet new compliance requirements (Pollard, 2016).

Many organizations begin to think on the tripod of sustainability: economic, social and environmental. With this, they include Green IT in their practices to achieve strategic and environmental goals (Salles *et al.*, 2013).

It is worth noting that social and environmental responsibility is no longer an option for organizations, but a matter of vision, strategy and often survival. In this context, intelligent IT management can be an alternative for organizations, not only to minimize the damage caused to the environment, but also to improve the effectiveness of electricity consumption, reduce the disposal of equipment and reduce business operating costs, in addition to developing a sustainable organizational environment in harmony with the desires of today's society (Salles *et al.*, 2013).

As a result, companies have been issuing sustainability reports that provide guidance on Green IT and present the objectives, targets, indicators and results of these practices.

In this same movement, universities, cities and even countries have embarked, indicating in official documents practices for reducing the environmental impact of IT, which shows that the concern transcends commercial organizations and becomes a concern of all those who use IT.

Yet the vast majority of organizations do not think, plan or execute Green IT practices, or when they do, they do not do so because of environmental risks. Similarly, the motivators of Green IT practices are not as well-known as they should be, even if such practices result in cost reduction (Salles *et al.*, 2013).

Within this context, this nationwide research aims to map the perception of IT experts, coordinators and managers in terms of green IT practices in organizations and their strategic positioning, and to measure their utilization.

2. THEORETICAL FRAMEWORK

Some key concepts related to corporate sustainability, IT, its environmental impacts and some Green IT initiatives are presented in the following subsections.

Corporate sustainability

The concepts of socio-environmental responsibility or corporate sustainability, in practice, are guided by ethics and transparency in business management and indicate that an organization should have its results measured in three inseparable spheres: economic, social and environmental. It is on this tripod that companies must guide their decisions. That is, business ethics occurs when decisions of interest to the company also respect the rights, values and interests related to the impacts generated by it, whether on society, the environment or the future of the organization itself (Pereira, 2007).

There are several indexes around the world that classify companies according to their socio-environmental responsibility. Most of them analyze companies that have shares in the stock market, checking economic data, environmental and social performance, corporate governance assessment, risk management, climate change mitigation, and labor practices. These companies are classified as sustainable or not through this information. In this way, shareholders will know whether they are acquiring shares from environmentally friendly partner companies and what advantages they will have in acquiring them. The analysis involves issues such as: anti-crime and fraud policy, brand management, CRM

(Customer Relationship Management), engagement with strategic audiences, supplier management, business risks and opportunities, environmental policy, financial inclusion, human capital development, labor practice and human rights indicators, in addition to retaining and attracting talent. It should be noted that in order to become sustainable, companies must demonstrate ethics in their relations with employees, customers, suppliers, and partners, and must respect the environment through their daily practices (Nanni; Passos, 2014).

The involvement of organizations with socio-environmental issues can become business opportunities, contributing to improve the quality of life of stakeholders, preserving natural resources and generating competitive advantage. Thus, proactive companies anticipate the search for the best alternatives to transform environmental issues into business issues. Such initiatives converge to potentialize organizational changes, which start with organizational strategies, culminating with the practical and structured part mostly by the IT team, responsible for accomplishing the company's state through processes and technologies. Changes of vision, position and products aim to change the direction in which the organization is headed (a shift in strategy), reflecting in changes (Salles *et al.*, 2013).

The integration of the company's business processes and Corporate Social Responsibility (CSR) are directly linked to the performance of the organization and the creation of a competitive advantage (Bohas; Poussing, 2016).

The intensity of adoption of Green IT practices is the extent to which an organization incorporates them into its pollution prevention, product management and sustainable development strategies (Ainin *et al.*, 2016).

Information technology and its environmental impacts

The rapid decline in IT costs and the increased efficiency and speed of systems and equipment represent the change in organizations. The business is increasingly dependent on the IT area, in which it has become, besides strategic, a competitive advantage (Marques; Lazzarini Neto, 2002).

Some authors show the usefulness of Porter's value chain analysis to better visualize where the connection between IT and the company's business occurs and, consequently, identify procedures to adapt organizations to possible changes (Balarine, 2002).

The continuous growth in the use of IT has raised a concern regarding environmental issues related to the misuse and disposal of electronic equipment. Added to the expenses necessary to maintain the IT infrastructure with ser-

vers, computers, monitors and other peripherals working properly, the IT area represents the third largest source of energy consumption within large companies (Salles *et al.*, 2013). The other side of energy consumption can vary according to the various stages of economic development; therefore, the increase in consumption can be positive, showing economic growth (Rahimi; Rad, 2017).

Another environmental impact that results in climate change is the growing emission of CO_2 by servers, which is today monitored and is often evolving (Kern *et al.*, 2015).

Concern over the impact on IT is so great that even the onboard systems of the cars are analyzed with the aim to reduce fossil fuel consumption and CO_2 emission into the atmosphere (Matamoros de Luis *et al.*, 2015).

Companies have already realized that just being concerned does not work. Therefore, they are already starting to take action, especially when the subject is the exhaustion of traditional technological development, involving the disposal of electronic waste and the waste of energy due to processing deficiency or misuse of available resources (Ferreira; Kirinus, 2010).

Green IT

Green IT initiatives are defined as investments in IT and its deployment, use and management in order to minimize the negative environmental impact of IT, business operations, and end users' products and services (Loeser *et al.*, 2017).

In some cases, Green IT practices create product-specific niches, such as the e-book market, on which publishers have increased the perception of their environmental compatibility, reduced production costs, lowered environmental impacts, and satisfied growing environmentally-conscious customers (Hsu *et al.*, 2017).

Some terms are used to refer to Green IT: Green Computing, Information and Communication Technology (ICT) for the environment and IT for the environment and sustainability (Asadi *et al.*, 2017).

The capital of Green IT is composed of three dimensions: (1) Green IT structural capital, which refers to the green IT infrastructure, including hardware, software, network and information technology, established under the concept of greening; (2) Green IT human capital, which refers to the ability and experience of the IT team to have green professional knowledge and an understanding of energy conservation in technology, as well as personal development with green IT capabilities, through training and education; and (3) Green IT relational capital, which refers to the management

of green IT and the relationship of companies with partners and users, adopting an environmental protection concept in the supply of products and services (Chuang; Huang, 2015).

Numerous actions can result in the reduction of environmental impact, such as server virtualization, whereby the physical resources of a server are shared by multiple virtual servers, minimizing energy expenditure; the reduction or elimination of printing; the change of processes for the acquisition of new equipment to meet environmental requirements; and the reduction of CO_2 footprint, such as shutting down computers at idle times (Nanni; Passos, 2014).

Along with these actions, there are also moral and social motivations in the use of IT devices to reduce impacts on the environment, taking into account the initiative of each individual (Koo *et al.*, 2015). In this way, organizations should develop awareness programs on Green IT issues for their employees (Akman; Mishra, 2015). In addition to raising awareness, organizations should make an assessment of whether their environment is prepared for the adoption of IT practices, analyzing suppliers, competitors, investors, a company's partners and customers (Alkali *et al.*, 2017).

Green IT initiatives, which are really effective, tend to require inter-organizational collaboration and are crucial for results in the amount and scale required for the expected result (Oakleaf, 2015).

There are other divisions of Green IT practices adopted by organizations, which are classified in greater detail in Box 1, relating the focus of action in seven general categories: awareness practices, green data center, disposal and recycling, alternative energy sources, hardware, software, and printing.

Although some of these practices require high investments, especially those related to datacenters, alternative energy sources and the replacement of obsolete equipment with new ones, a large part of these sustainability practices can be adopted without compromising the financial health of the company, depending only on the effort, the will of the users, and the support and direction of the organization (Dolci *et al.*, 2015).

With the environmental impacts of IT, Green IT Governance stands out, as it requires the inclusion of new players, controls and metrics, as well as new indicators, especially in Control Objectives for Information and related Technology (COBIT), which aims to ensure that IT resources are aligned with the organization and can assess social and environmental responsibility, meeting international technical, professional and regulatory standards specific to IT processes. On the other hand, the Information Technology Infrastructure Library (ITIL), a library that brings together industry best practices and IT services, must adapt by having to provision the costs of a new green infrastructure. The models cited can be useful in organizational structuring, processes and leadership, with the aim of ensuring that IT supports and assists the strategies of organizations and the inclusion of sustainability in their objectives (Richter, 2013).

3. RESEARCH METHODOLOGY

This study has as mission to understand the factors related to the adoption of Green IT practices in organizations and to understand what to optimize, this being a work classified as exploratory research that, according to Gil (2010), aims to increase familiarity with the problem and make it more explicit.

Chart 1. Green IT practices

Practice	Description
Server Virtualization	A technique that allows more than one operating system to be run simultaneously on a single physical device. This decreases the idle processing capacity in each server and allows reducing the size (number of servers) and therefore the consumption of data centers. Although this innovation was originally developed to save costs with machines and physical space, it also proved advantageous for saving natural resources.
Paperless	Identification and elimination of unnecessary use of paper.
Correct disposal of electronic waste	Dispose that does not impact the environment, forwarding the correct process for removing toxic materials from these equipment.
Water reuse	Reuse of water from the cooling of the datacenter for use in the company.
Equipment management	Based on function and resources, the management of equipment adapts its resources to its function in the company, increasing its life cycle in the company and optimizing the purchasing of new equipment.
Energy management	Energy saving practices, such as the implementation of screen rest, standy by mode and hibernation of the equipment, in order to save energy.
Alternative energy	Use of alternative energies to supply the datacenters and equipment used in organizations.

Source: The authors.

This research is also considered qualitative and quantitative, which, according to Gray (2012), opens the possibility of two types of data analysis: numerical and statistical for quantitative data; and thematic textual for qualitative data.

For a better understanding of the method adopted in this research, the following main steps are listed below:

- Step 1: A literature review was conducted to identify key green IT practices and their benefits.

- Step 2: Based on the literature review, a questionnaire was prepared and submitted to 97 IT professionals from companies of the most varied business models, who studied MBA at two major Brazilian institutions.

- Step 3: Before applying the questionnaire, a pre-test was conducted with a representative of each type of respondent, there being no changes in content, only minor adjustments.

- Step 4: The data was collected through the questionnaires and tabulated to obtain the profile and perception of the respondents.

- Step 5: Three results analysis were performed: respondent profile, strategic planning profile, and Green IT profile.

- Step 6: Four cross-checks of some results were performed: between the use of strategic planning and the existence of environmental targets; between the existence of environmental policies and knowledge of green IT practices; between green IT practices and server virtualization; and between green IT practices and electronic waste disposal.

- Step 7: Finally, in the consolidation of the research, the conclusions and proposals for future work were described.

Characterization of research subjects

The sample consisted of 97 respondents, and the questionnaire was sent to a mailing list of 5,000 professionals, former MBA students from two major Brazilian institutions located in the state of Rio de Janeiro.

Respondents were divided into two groups in order to obtain different views, as presented in Chart 2. In the first group, composed solely of IT managers, a strategic vision was sought, while the second group, composed of coordinators and experts from organizations in various business branches, brought a tactical/operational vision.

Chart 2. Characterization of research subjects

#	Group	Description
1	IT Managers	IT area managers, responsible for all the planning and its execution.
2	IT Coordinators and Specialists	Leaders and Specialists in the IT area, responsible for the execution of activities.

Source: The authors.

4. DATA ANALYSIS AND DISCUSSION

The purpose of the questionnaire was to obtain from IT professionals the perception of the points raised in the literature on Green IT, as explained in the sequence.

Respondent profile

A total of 97 professionals were interviewed and are divided among the following professional profiles, according to table 1.

Table 1. Professional profile of respondents

Profile	Quantity	%
IT Coordinator	15	15.4%
IT Specialist	49	50.5%
IT Manager	28	28.9%
Other	5	5.2%

Source: The authors.

It is observed that in Table 1 only five respondents do not fit the planned survey profiles, which represents only 5.2% of the total. With this scenario, the level of confidence in the data collected increases significantly, staying within what was planned, with the other profiles comprising 94.8%.

Table 2 indicates the distribution of interviewees according to the location of the companies where they work.

Table 2. Company location profile of the professionals interviewed

Location	Quantity	%
Rio de Janeiro	64	66.0%
São Paulo	17	17.5%
Other states	13	13.4%
USA	3	3.1%

Source: The authors.

Most respondents work in Rio de Janeiro (66%), followed by São Paulo (17.5%) and the other states (13.4%). Completing the distribution, the research obtained three respondents from the USA, which represent 3.1% of the total. An additional point in this characterization is that 49.5% of the compa-

nies in which the interviewees work are IT consultancies and services; the other respondents (50.5%) are pulverized into education, oil and gas, health, third sector and others.

Table 3 shows another positive item: 70.1% of professionals have more than 10 years of experience in the IT area; at the other extreme - professionals with very little experience (less than 1 year) - they represent a very small portion (2.1%). The others are divided between those with 1 to 5 years of experience (15.4%) and those with 5 to 10 years of experience (12.4%). In another perspective, the group of those with more than five years' experience includes 82.5% of respondents. The less experienced, with less than five years of experience, comprise only 17.5% of the respondents. It is concluded that the majority of the respondents are highly experienced professionals and their responses represent the IT profile of the organizations.

Table 3. Profile of respondents by experience

Experience	Quantity	%
Less than 1 year	2	2.1%
From 1 to 5 years	15	15.4%
From 5 to 10 years	12	12.4%
More than 10 years	68	70.1%

Source: The authors.

Strategic planning profile

With the great degree of uncertainty in the markets, companies increasingly seek to plan, set objectives and goals for a certain period of time, as well as using governance, IT and corporate processes. In the research, the authors sought to verify whether the organizations have a strategic planning.

Table 4 portrays exactly the concern with the company's strategy, with 81.5% of the respondents stating that the companies in which they operate have strategic planning, while 11.3% stated that the companies do not have a strategic planning, and 7.2% do not know whether or not this planning exists. It should be noted that it was not the purpose of this survey to measure the degree of maturity of this planning, but only the existence of this process in the company, which is a very important item at this time of uncertainty in global markets.

Table 4. Use of Strategic Planning

Does your company have Strategic Planning?	Quantity	%
Do not know	7	7.2%
No	11	11.3%
Yes	79	81.5%

Source: The authors.

Another item of the survey is the verification of the concern with the environment by the companies. The concerns are: whether sustainability is included in their strategic planning; whether there are environmental goals; whether there is an environmental policy; and whether an environmental policy is required from partners and suppliers. With these points, the real concerns with the environment were shown.

The first point to check was whether there are items on sustainability in strategic planning. Table 5 shows that more than half of the companies have sustainability items in their strategic planning (52.6%). However, 35% of the enterprises do not have these items and 12.4% of the respondents do not know whether or not there is any planning.

Table 5. Sustainability items in strategic planning

Does strategic planning have items related to sustainability?	Quantity	%
Do not know	12	12.4%
No	34	35%
Yes	51	52.6%

Source: The authors.

In order to measure and control the progress of environmental objectives it is necessary to define targets to be achieved. Therefore, checking whether environmental targets exist is quite relevant. The numbers found in the survey show that 40.2% of the companies have environmental targets and 43.3% do not, besides the fact that 16.5% do not know if they have. In other words, the numbers of those who do or do not have targets are very similar, as shown in Table 6.

Table 6. Use of environmental targets

Does the company have environmental goals?	Quantity	%
Do not know	16	16.5%
No	42	43.3%
Yes	39	40.2%

Source: The authors.

When asked if the organizational demands of business partners and suppliers have an environmental policy, 20.6% said that the companies demand it, 49.5% said that they do not demand it and 29.9% could not answer (Table 7).

Table 7. Environmental policy for partners and suppliers

Does the company demand environmental policy from its partners and suppliers?	Quantity	%
Do not know	29	29.9%
No	48	49.5%
Yes	20	20.6%

Source: The authors.

Green IT Profile

At this point, the research aimed to raise the companies' profiles regarding the knowledge and use of Green IT practices, opening space also for suggestions on this subject.

Initially it was verified if the companies had knowledge on Green IT. Those who said they knew the practices totaled 42 (43.3%) and those who said they did not knew, 52.6% (Table 8).

Table 8. Knowledge of green IT practices

Are you familiar with Green IT practices?	Quantity	%
Do not know	4	4.1%
No	51	52.6%
Yes	42	43.3%

Source: The authors.

Table 9 shows the profiles of use of Green IT practices, which differ among companies, according to respondents. From a positive point of view, energy management and virtualization practices, always used or frequently used by 67.0% and 55.7%, respectively, are emphasized.

The negative highlights are alternative energy and water reuse practices, which are never used by 64.9% and 63.9% of companies, in this order.

Cross Analysis

In order to deepen the analysis and investigate the relationships between elements, some data were cross-checked, with subsequent analysis based on the strategy of the organizations and Green IT, which interact and influence each other.

Table 10. Strategic planning vs. environmental targets

Does your company have strategic planning?	Does your company have environmental goals?		
	Does not know	No	Yes
Do not know	28.6%	71.4%	0.0%
No	0.0%	72.7%	27.3%
Yes	17.7%	36.7%	45.6%

Source: The authors.

The crossing of data presented in Table 10 was the starting point, with which it was verified whether the companies that have a strategic planning, which are the great majority (n=79), also have environmental targets, reflecting the existence of environmental concern. When challenging, these two questions bring some information: of the companies that have strategic planning, 45.6% also have environmental targets, 36.7% do not, and 17.7% of the respondents did not know how to inform about these targets. For companies that do not have strategic planning, 27.3% do and 72.7% do not have environmental targets.

The figures in Table 6 show that there is a concern with environmental targets, but to a lesser extent than expected, since the companies that have them account for less than half of the companies surveyed. In other words, environmental targets are not directly linked to strategic planning.

When the study crosses the responses regarding the existence of environmental policy and knowledge on Green IT practices, the data is very interesting, as shown in Table 11.

Of the companies that have an environmental policy, 53.6% are not aware of environmental practices, i.e. their environmental policy does not include Green IT practices; 41.5% have an environmental policy and know Green IT practices, while 4.9% have an environmental policy but are unaware of Green IT practices. In companies that do not have an environmental policy, the figures follow this trend: 52.6% of this universe does not know the practices and

Table 9. Green IT Practices

Green IT Practices	Never uses	Uses little	Always uses	Frequently uses	Uses in some cases
Virtualization	12.4%	11.3%	22.7%	33.0%	20.6%
Paperless	14.4%	32.0%	20.6%	22.7%%	6.1%
Dispose of electronic waste	28.9%	9.3%	20.6%	22.7%	18.5%
Water reuse	63.9%	9.3%	10.3%	10.,3%	6.2%
Equipment Management	13.4%	20.6%	14.4%	22.7%	28.9%
Energy Management	1.0%	18.6%	40.2%	26.8%	13.4%
Alternative energy	64.9%	15.4%	3.1%	7.2%	9.3%

Source: The authors.

47.4% know the practices, accordingly. Most organizations do not know the practices of Green IT, regardless of whether they have environmental policy or not.

Table 11. Environmental policy vs. green IT practice knowledge

Does the company have an environmental policy?	Is it familiar with Green IT practices?		
	Does not know	**No**	**Yes**
Do not know	11.1%	50.0%	38.9%
No	0.0%	52.6%	47.4%
Yes	4.9%	53.6%	41.5%

Source: The authors.

Another crossover was between the answers related to the knowledge of Green IT practices and the use of the server virtualization technique. As expected, more than 95% of companies that know the practices, use, to some degree, the virtualization. When the focus is on companies that do not know the practices of Green IT, there is also a high proportion of use of the technique (82.4%), and 41.2% always use it or frequently use it (Table 12).

One of the most visible Green IT practices is the correct disposal of electronic waste, because from it the parts are donated, reused, and sent to countries with technology to separate the chemical components that make up the equipment. Thus, a cross-check of responses related to companies' knowledge on Green IT practices and e-waste disposal was made, as shown in Table 13.

It was verified that 71.4% of the companies that know the practices discard electronic waste at some point, and 16.7% of them always do so. Interestingly, these percentages were lower than those found among companies that are not familiar with Green IT practices: 72.5% and 25.5%, in that order.

With these data, it can be inferred that there is wide adoption of this practice, which can be justified by the fact that it is one of the most publicized in the media.

5. CONCLUSION

This study, through the literature review, identified green IT practices and their benefits. Then, based on the literature, a questionnaire was applied to a group of 97 IT experts, coordinators and managers, in order to identify whether Green IT practices would be included in the organizations' strategic planning.

The results indicated that most of the professionals have more than 10 years of experience and work in IT consulting companies located in the states of Rio de Janeiro and São Paulo. As for companies, most have strategic planning and items related to sustainability. However, more than half of them (52.6%) do not know Green IT practices, and those that do correspond to 34.3%. The practices most used by all companies are energy management and server virtualization (>50%).

From the cross analysis of the data collected by the research instrument, it was possible to verify whether the environmental goals are included in the strategic planning of the organizations, and whether having knowledge on Green IT practices relates to its use and the existence of an environmental policy. A significant number of organizations were found not to treat Green IT as a strategic item, not including it in their strategic planning and environmental policy, and not creating environmental targets.

This conclusion that Green IT is not approached in a strategic way causes a counterpoint: although IT, according to

Table 12. Green IT Practices vs. Server Virtualization

Knows Green IT practices	Does it use the server virtualization technique?				
	Never uses it	**Uses little**	**Always uses**	**Frequently uses**	**Uses in some cases**
No	17.6%	15.7%	11.8%	29.4%	25.5%
Yes	4.8%	7.1%	38.1%	33.3%	16.7%
Do not know	25.0%	0.0%	0.0%	75.0%	0.0%

Source: The authors.

Table 13. Green IT practices vs. e-waste disposal

Knows Green IT practices	Does it use the correct disposal of electronic waste?				
	Never uses	**Uses Little**	**Always uses**	**Frequently uses**	**Uses in some cases**
No	27.5%	9.8%	25.5%	17.6%	19.6%
Yes	28.6%	4.8%	16.7%	30.9%	19.0%
Do not know	50.0%	50.0%	0.0%	0.0%	0.0%

Source: The authors.

the literature, is understood as a strategic asset, indispensable for the business and generator of competitive advantage, its environmental impacts are not treated strategically. Another contradictory point is the global movement to create "greener" products and services, in which their entire life cycle is analyzed and treated by organizations in a strategic manner. However, the impacts of IT are not included, as if they were not part of the life cycle.

It is clear that the impacts of IT are being addressed at a level other than the strategic one, not being treated with importance and as a priority among the strategic planning items.

It is hoped that this study can contribute to development in the context of reducing environmental impacts and can suggest mitigations to this end.

With the answers presented by this study, the natural way is to deepen in future research, with themes such as: maturity in Green IT processes (creating a scale for it), Green IT relationship with the main IT governance frameworks (COBIT) and quality in IT services (ITIL), proposing the inclusion of Green IT process. Another issue that cannot be forgotten is the impacts of Green IT on the Internet of Things (IoT) and Industry 4.0.

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