Proposition of a Lead Indicator for IT Actives Update: A Case Study in the Brazilian IT Division of Perkons S/A

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Abstract

Decision making regarding the timing for updating an IT - Information Technology device may be influenced by personal biases, where a technology driven manager and a non-technology driven manager might diverge over the matter, and by the complexity that surrounds the concept of IT itself. Contemporary methodologies such as ITIL and Cobit suggest that IT managers must provide the company with both business continuity and proper application of company resources, such as manpower and finances. The proposition of a Strategic Performance Indicator allows the managers to make better, indicator founded decisions, thus antagonizing the subjectivity that permeates the biases and the process of determining IT actives update per se. The objective of this paper is to propose a method for creating and using an indicator, in the process of deciding whether or not it is appropriate to update an IT active.

Introduction

Information Technology, IT, is a collection of components capable of intervening in the stream of data and information on companies. These components are hardware, software and telecommunications. One of the possible classifications for these components is active and passive devices. Passive devices mainly display or transport data and information, and active devices are capable of manipulating and transforming data and information. Displays, printers, antennae and hubs are examples of passive devices. Routers, computers and network switches are examples of active devices.

An IT active is a tool that companies can use to manipulate, transform and compute data and information. On the contemporary organization, IT active devices are the computers, servers, software and network connection resources that are used routinely. A strategic performance indicator for updating IT active devices is a strategic indicator that supports the decision making process of whether or not it is appropriate to update any given IT active in a company.

John Von Neumann (1946) proposed an IT active devices architecture that is still used on the vast majority of computers. This architecture was proposed in the form of a processor, a memory for data, computing instructions and a storage area. Computer networking added to this dimensions the capacity to transmit data between IT active devices as a new and significant characteristic.

Decision making process regarding IT active devices update is a complex matter since several variables must be taken in account. Moore's Law (Moore, 1965), dictates that computer power for processing, storing and computing data and information duplicates in 24 months, and it's price lowers by as much as 30% in the same period. Computer technology, on the other hand, evolves as fast or even faster, for every new capacity created by hardware engineers, software is quickly developed to enjoy the new functionality, consuming telecommunication resources. Therefore, in spite of the fact that computer power rises as its price lowers, managers cannot afford to take wrong decisions regarding the update of the IT actives since, according to Carr (2003), companies are spending as much as 10% of their revenues on IT.

One of the abstractions possibilities to help understanding companies is the comprehension of organizational structure. Organizational structure proposes that the disposition of employees is used to facilitate access to the resources needed in accomplishing companies´ goals, as raw materials and energy, which are the main purpose of creating divisions, departments and business units. On information economies, it is possible to believe that the main raw material used by the employees is data and information, and that the tool handled by these employees on executing their daily chores is IT.

Company policy will often dictate values, mission and vision definitions that should be employed by IT in order to reach its alignment with companies' strategy. Several methodologies have been developed and are being deployed on contemporary companies, mostly with ITIL and Cobit. Despite diverging in some aspects and overlapping on others, both methodologies agree on three main perspectives. First, IT must support and guarantee business continuity, despite de dependence of the business on IT actives. Second, quality has to be ensured for the service provided by IT department. Finally, costs should be taken into account, in order to do not offend the first perspective.

This coordination between the two perspectives provides IT managers with a dilemma. Guaranteeing quality isn't an easy task, for quality in itself has a dubious meaning. IT actives quality has little to do with the direct capacity of how much gigahertz of cycles it can perform per second, or how many gigabytes can be stored or transported per second. IT actives quality is much more dependent on the perception of the users, on how much any given active is capable of supporting any given user in any given task, without failing or delaying the activities.

There is another issue on this point. Even though the cost is lowering for every new possible gigahertz, the capacity to use by the employees isn't growing. IT actives had their prices diminished, but it offers more capacity even though the people behind the machines are not fully capable of using it. Often another technology hits the market before the user is fully acquainted with the current one.

From this point of view, the problem that permeates this research can be presented. Considering the fact that companies organize employees in order to have better access to raw materials and energy, and considering that IT actives are the tools handled by employees to beneficiate the raw materials, it is possible to avoid the personal biases on deciding about IT actives update. To help shedding light on this problem, the researchers propose a Strategic Performance Indicator for IT actives update, applied on Perkons S/A, a two hundred and fifty employees company that relies heavily on IT for its daily activities in Colombo city, Paraná state, Brazil.

Perkons S/A is an IT company that creates, develops and deploys traffic security systems such as radars, traffic lights and it is the creator of the concept of the electronic bumper, an device that measures speed, and, in case of excess, photographs the offender, in order to give a traffic tickets. Perkons' main costumers are traffic agencies across South America, and there are 12 main business competitors on the industry worldwide. About 96% of Perkons' employees have access to computers on the job and 84% use a dedicated IT Active.

The company that is subject to this research, decision making process for IT actives is composed by three steps. First, IT active users detect the unfitness of any given item to the tasks demanded. That perception is conducted to the area administrator that monthly gathers any complaints. On the beginning of every month, there is a conference gathering the area administrators and the high administration, in order to determine if a requisition is attended, postponed or denied.

This decision making process clearly depicts the subjectivity of either updating or not an IT active. If the users or the area administrator are computer illiterate, necessities might be never perceived. According to "the mood" of the high administration, a requisition might be never supported, be it either real or only misperceived. Therefore, this decision process might be misjudge and therefore misapply up to 10% of the revenue of the company.

The strategic performance indicator for updating IT active aims to help on this process. By measuring the amount of use of the main characteristics of an IT active, its processor, memory, hard-disc, critical processes and network, it is possible to measure how long does an IT active is above the condition depicted as concurrence for resources (Tannenbaum & Woodhull, 2006). The sum of time presented by this condition can be translated into monetary terms by considering employee time cost and company revenue cost. Also, employees can be sorted according to the area divisions and to the functional role divisions, providing decision makers with four facts: how much has been spent by the company with the employee requesting actions from its IT actives and having to wait for the response, how much has the company failed to gain by having to wait for the action of the employee to be completed, what is the average cost of employee time for any given department and what is the average cost for any given functional

role, considering the inadequacy of its IT actives.

To generate this data, a strategic performance indicator for updating IT actives is created in observation to the theoretical assumptions that follow, which guide strategic alignment for IT according to Cobit and ITIL from company's strategic management process perspective, strategic control for IT departments using Balanced Score Card, BSC, (Kaplan & Norton, 1997) and IT actives cost and quality. The indicator is presented as a lead indicator that may be used to represent both the current cost of IT actives inadequacy and as base for best case and worst case scenarios of time until update is required for IT actives.

The proposition per se is demonstrated in three steps. First, a documentary research must be performed on the organization in order to uncover evidence of IT strategic management. Then, primary data is acquired by monitoring IT actives on the organization. The data collected is arranged in terms of one IT strategic indicator for IT actives update for each of the actives monitored, one indicator for each functional role displayed in the organizational charts, and one for each division in the organization. Finally, data is arranged to generate a lead indicator that represents IT actives performance for the whole company. In Final Considerations section a walkthrough is presented as a step-by-step procedure for creating the proposed lead indicator.

Theoretical Assumptions

The theoretical assumptions employed on this work are divided into five perspectives. Strategic management process is used to better understand polices that rule over general characteristics of the organization. From strategic management process understanding, the issue of strategy control is approached through a BSC perspective, as displayed on Figure 1.

Strategy planning and management for IT and IT actives suffers examination by two perspectives, Information Technology Infrastructure Library, ITIL and Control Objectives for IT and related technologies, COBIT. These perspectives are aligned with the organizational strategic process and control, as depicted in Figure 2. Both cost and quality for IT actives are related in terms of risk of subjective decision making, therefore justifying the use of an strategic performance indicator for updating IT actives as a mean to confront this form of management, as shown on Figure 3.

Strategic Management Process

Strategic management as a process can be understood as a series of defined, organized, finite and retro-feeding steps, which aim to adequate the organization to its internal and external environment. This process is composed by environmental analysis, corporate policies establishment, strategy formulation, strategy deployment and strategic control.

Environmental analysis is required by the organizations in order to better understand whichever stimuli surrounds the company and which are the capabilities inherently held to respond to these stimuli, according to Hitt, Ireland and Hoskisson (2003). Environment is divided in operational and general perspectives, according to the ability of the company to control and to influence them. Operational environment perspective includes competition,

neighboring communities, costumers, local media, governmental agencies and agents, syndicates, suppliers and activists. General environment includes broader aspects of the reality, such as socio-cultural influences, technologic scenario, Global Politics and economic factors.

Corporate policies establishment is the creation of a general guidance to all employees, which should help on taking daily decisions. This general guidance can be found in corporative mission, vision and objectives (Stoner & Freeman, 1999), or in organizational mission, business mission and targets (Kotler, 1998). Organizational targets can be classified according to their terms and to their scopes. Short term and long term targets are disposed in a one to five year basis, and scopes are described as market position in innovation, productivity, revenues, administrative and employee performance and social responsibility.

From the environmental analysis it is possible do formulate a corporate strategy that aims to guide business plans in order to supply the organization with the ordination required to be successful. Strategy can be founded by a Strengths and Weakness, information derived from the external environment, and an Opportunities and Threats, described by the internal environment, matrix, also known as SWOT Matrix. Environmental analysis also supports the determination of which core competences (Prahalad, 1990) are required by the company to achieve its goals and therefore should be stimulated and be strategically considered.

There is five-step segmentation on strategic deployment. Change effects analysis, organizational structure analysis, organization culture analysis, deployment approach selection and deployment and strategic evaluation. Every strategic action might conduce to more or less grave influences in the organizational environment. Most strategic actions influence or are supported by organizational mission, vision and objectives.

In order to the strategy to be effective it is imperative that strategic control is exercised. Strategic control is a process that monitors and evaluates strategic planning process. Strategic control aims to control, shape and assure (Alday, 2000) that strategy is always viable and representative for the organization (Andrews, 1980; Chakravarthy & Doz, 1992). Strategic control also guarantees that all stakeholders are properly informed about strategic goals, targets and performance measures.

Strategic Control: Balanced Score Card

Considering that strategic control is a delicate part of the strategic management process, the researchers dedicate a separate session to the subject, resorting to BSC methodology as a useful tool for controlling strategy success in the organization. The 90´s provided the organizations with unseen challenges, most noticeably the fact that sustainable competitive advantage became to reside in the intangible aspects of the products and services. In this way, manufacturing and beneficiating good is not a guarantee of success, but more a prerequisite of company's legitimacy and subsistence.

History provides that most performance measurement tools in organizations are based on financial measures as revenue, income and taxes (Chandler, 1962). In the industrial times, a financial perspective for control is enough to measure a company's success, but considering

information age, it is not. Environments wax and wane dynamically in response to events worldwide, so success measuring is laden with complexities that disrupt measuring efforts (Chandler, 2002).

Starting from a work composed for KPMG, Kaplan and Norton (2001) proposed a tool for strategic control that comprehends the mutability of environments and, along with the financial perspective, adds more, with the purpose of providing the tool with a balance between financial results measurable with other dimensions such as internal processes, costumers, learning and growth. This idea of balancing the perspectives in order to provide a better understanding of success is the main idea of the tool's name, balanced score card. Balancing the strategy it is important because of the strategic process analyses the present time, and strategic planning aims to build the future, therefore demanding both short term and long term goals to be accomplished (Gluck, Kaufmann & Walleck, 1980).

Employing four perspectives, financial, internal, costumers, learning and growth allows strategy to encompass all goals, either to tangible and intangible corporative assets. From this perspective, financial indicators represent the tangible and short term aspects of organizational strategy, and the other forms of indicators might represent longer and intangible aspects. The use of more perspectives than just finances can be smoothed as the way as the organization believes that its financial health can be sustained through other indicatives that, each one of its own way, contribute to increasing revenue and sales.

These perspectives are sustained by indicators that, in a general way, are fragile and can be refuted for any manager that doesn't believe on its relevance. Kaplan and Norton (2001) suggest that indicators should be located from within organizational values for learning and growth perspective, on company's vision for internal perspective and on mission for costumers' perspective. It is critical, though, to refer to Mankins and Steele (2005) where strategic success is often less reached than expected, so the same might be a reality for determining balanced score card's indicators for measuring strategic performance.

Strategic Planning Process	**Strategic planning process in the subject organization**
Environmental Analysis	Increase in competition, new competitors, costs growth, workforce availability decrease, law change towards an auction bias, private costumers increase, international costumers increase.
Corporate Policies Establishment	Deliver differentiated services to the costumers, using as much IT as possible, seeking quality as an advantage.
Strategy Formulation	Creating better products than the competition Building complex systems that satisfy costumer's needs. Keep workforce motivated and generating ideas that may be potentially lucrative
Strategy Implementation	All projects shall be PMBOK – *Project Management Body of Knowledge* based, with adequate budget for each process focus.
Strategic Control	Variable income program for the employees determined according to the genera, strategic and department targets, according to monthly control.
BSC	Construction of a strategic map that shows the relations between strategic control targets and organization targets.

Figure 1 – Strategic Planning process and the subject company strategic planning process

Figure 1 is created by collecting data from the subject company's documents. From a

general “strategic proposition” board determination, data is translated into the steps described by the strategic planning process. The determination is available for public access, and its interpretation within the strategic planning process helps the understanding of corporate strategy.

IT Strategic Management and Control

Two main methodologies can be applied by IT managers to guarantee that IT departments are aligned to company’s strategies. In this work research is conducted under COBIT, Control Objectives for IT and related Technologies and ITIL, Information Technology Infrastructure Library. Both methodologies expect to guarantee that IT is a needed resource for the company to achieve sustained competitive advantage (Cobit, 2005) and that IT, in companies that are not IT dependent, is a resource that contributes with corporative goals.

COBIT, in its 4.0 version is segmented in domains, which one aiming for the proper application of company’s resources. The domains for IT control under COBIT methodology are declared as planning and organization, acquisition and implementation, service deliver and support and monitoring and evaluation for IT processes. COBIT’s main objective is rationalize IT investment, guarantee service quality to core businesses and accountability for IT performance in contrast to service demanded by the industry (Carr, 2003, Cobit, 2005).

IT strategic management cannot be offered to the stakeholders without a strategic control methodology (Kaplan, 2001) to evaluate and examine IT management process in itself. Monitoring and evaluation domain constantly verifies performance management, compliance, accountability and security. For this domain, the main objective is to measure IT performance before IT services fail to serve organizational needs.

The other IT management methodology used on this work is ITIL, an open source, British founded methodology proposed by the Office of Government Commerce. ITIL subsides on company’s needs to constantly invest on their infrastructures, which in turn become more intricate. As core businesses are developed and have to depend on technology, ITIL aims to offer a comprehensible way to manage the intricacies, offering reliability to both the businesses and to the people that have to use IT to deal with daily chores.

The library is standardized through BS 15000, as an expansion to ISO 9000:2000. As it is a quality focused standard, ITIL seeks to relieve the need to continual improvement on IT services provided. The library is divided into six overlapping elements, which create convergence points, called perspectives. Business perspective is related to a better service to be provided. Application Management controls development and lifecycles for systems. Service deliver focuses on managing core IT products. IT support and services intend to manage the continuity of products delivered. Infrastructure management provides performance indicators that clarify the goodness of fit for IT resources. Security management intends to protect the organization from both internal and external threats.

Strategic	**Strategic planning process in the subject**	**COBIT**	**ITIL**

Planning Process	**organization**		
Environmental Analysis	Increase in competition, new competitors, costs growth, workforce availability decrease, law change towards an auction bias, private costumers increase, international costumers increase.	X (Corporate strategy determines environment for IT)	X (Corporate strategy determines environment for IT)
Corporate Policies Establishment	Deliver differentiated services to the costumers, using as much IT as possible, seeking quality as an advantage.	P01, P05; AI1	Service Level Capacity Availability
Strategy Formulation	Creating better products than the competition Building complex systems that satisfy costumer's needs. Keep workforce motivated and generating ideas that may be potentially lucrative	P02; P03; P04	Continuity Problem Change Risk
Strategy Implementation	All projects shall be PMBOK – *Project Management Body of Knowledge* based, with adequate budget for each process focus.	P010; DS1; DS2; DS13; DS8	Service and Help Desk
Strategic Control	Variable income program for the employees determined according to the genera, strategic and department targets, according to monthly control.	DS10; DS6; ME1	Spread on all organizational levels, managed by *Service Level Agreement*
BSC	Construction of a strategic map that shows the relations between strategic control targets and organization targets.	Infrastructure Fit Adequacy of Investment	SLA adherence Revenue contribution

Figure 2 – COBIT, ITIL and Organizational Strategic Planning

Both COBIT and ITIL demand IT departments to have performance measurement tools. IT actives constantly improve in terms of technology and resources. Software is developed in response to fully consume every new resource available.

Performance measurement tools developed to guarantee quality of service are rarely used to provide companies with better information for decision taking purposes. Despite being possible to monitor and evaluate every IT active on a network, companies still decide about IT actives update supported mainly by empiric data and personal biases. Proposing a strategic performance indicator for updating IT actives serves both to satisfy COBIT and ITIL recommendations as to provide decision takers with a clear indicator if it is appropriate to update or not an IT active. Understanding COBIT and ITIL from a strategic perspective allows the construction of Figure 2, which displays Strategic management process, Strategic management process for the subject organization, COBIT and ITIL controls, as deployed.

Cost and Quality for IT actives

According to Moore´s Law (Moore, 1965), hardware development is advancing and IT actives prices are decreasing. Not only companies have to rely on computers on a daily basis, but also society is increasingly immersed into technology. The technological environment, while boasting the speed of knowledge creation, accelerating service deliver and saving natural resources, challenges human beings to constantly learn, and constantly confront every knowledge already cemented (Senge, Carstedt & Porter, 2001).

	Environmental Analysis	**Corporate Policies Establishment**	**Strategy Formulation**	**Strategy Implementation**	**Strategy Control**
Planning and	External environment	Decision time and	Management	Delivery time, required	Governance and

Organization (Cobit 4.0)	information access and research Raw amount of data available	planning experience Understanding costumer's needs	competence. Information engineering. Technical competence for delivering solutions	tools, staff adhesion time. Staff capability, involvement corporate culture	monitoring costs. Retro feeding quality indicators
Acquisition and Implementation (Cobit 4.0)	Technical knowledge, benchmarking. Research and test time for new tools	Corporate definitions for system specification, time and budget Work excellence *versus* time and cost	Expansion costs, expectative, training depth *versus* costs Service quality expectative for acquired systems	Customization and agency costs for development (travel, meeting hours) Customizing and service delivery expertise	Decision time IT support. Monitoring costs to avoid resource expenditure Costumer's satisfaction fulfillment. Supplier satisfaction
Support and Delivery (Cobit 4.0)	Infrastructure adequacy for service support and delivery. Adherence to minimum system requirements and to systems best practices	Total time and workforce available for service delivery versus support team required versus costs. Work excellence *versus* time and cost	Deployment time *versus* workforce *versus* cost. Definition for control and management processes, as corporate policies	Contingency plan deployment. Deployment quality *versus* time available *versus* expertise	Deployment and support milestones monitoring
Monitoration and Evaluation (Cobit 4.0)	Benchmarking costs Monitoring and evaluation workforce expertise	Decision cost for monitoring level, runtime and improvement cycles. Resources available *versus* management requested quality	Monitoring culture towards total quality. Costs for monitoring and evaluation systems	Infrastructure crew costs. Task execution towards total quality and excellence	External audit's costs External audit's expertise and reliability
Business Perspective (ITIL) **(cont.)**	External environment predictability Research costs, new market costs,	Policy creation time, clarity on treating core competences. Growth, opportunity and risk costs.	Managerial focus towards excellence. Training and infrastructure costs for strategy making.	Costs for new products, sales position and market prospecting. New businesses infrastructural costs	Increase in managerial complexity External audit's infrastructure reliability.
Application Management (ITIL) **(cont).**	Planning time. Clarification of satisfaction level for all stakeholders needs	Expenditure policy for projects. Focus to either quality, excellence or cost	Staff training costs Staff training time and previous technical background	Deployment costs, creation costs, acquisition costs. Delivery excellence within project determinations.	Follow up time, milestones and breaking times planning. Time and expertise available for application delivery.
IT Service Delivery (ITIL)	Service level benchmarking costs. Service level perceived, expected and possible	Resources available and needed evaluation costs. Managerial demands versus needed resources	IT Service management costs Expected, possible and acceptable service performance	Task accomplishment according to corporate policies. Excellence on performing	Cost for monitoring and change management systems. Workforce focus on quality
IT Support and services (ITIL)	Quality improvement benchmarking costs General quality for systems supported	Service costs versus risk level Managerial demands versus technical resources for quality service	Service level agreement and priority setting costs Service level adherence as expected	Service maintenance and task attending costs Service excellence, solution versus disposition	Monitoring systems costs. Inspection costs for infrastructure adhesion to best practices
IT Infrastructure Management (ITIL)	Cost for change planning and management General quality for IT Components	Choice between state of art, industry level and low cost options	Policy definition for infrastructural quality according to business orientation. Focus on performance for policies	Technical intervention costs Excellence and best practices on service delivery	Inspection and auditing costs versus frequency of inspection and audits
IT Security management (ITIL)	Costs for exploring organizational environment versus security risk	Choice between state of art, industry level and low cost options	Leveling of technical abilities	Excellence on monitoring, by constant auditing efforts	Internal and external audits costs Technical capability for audit workforce.

Figure 3 – Subjective aspects of IT actives' cost and quality, as described by ITIL, COBIT and under the strategic management process for the subject organization.

This personal challenge to expand technological knowledge, in order to keep socially and professionally competitive, also contaminates companies. Contemporary enterprises must

understand better IT as a tool for adding value to businesses. As there is a certain amount of uniqueness on corporate environment, it isn't unsafe to presume that any give IT solution will not work under specific settings. This singularity and the following inadequacy of IT actives are product of IT itself, since information systems are composed by organizations, information and people (Laudon & Laudon, 2004).

It is imperative to have access to proper information in order to build a proper strategy. Without information about the environment, organizational capacity and costumer's needs it is impossible to answer riddles about daily tasks as the classic 5w2h composition of What? Who? Where? When? Why? How? How much? The same happens to IT departments. According to Hitt, Ireland and Hoskisson (2003) and Carr (2003), IT departments must be capable of knowing how the company satisfies costumer's needs, which tools are used, what employees need to know to efficiently handle the required tools and what is the most effective ways, from both quality and cost perspective, to satisfy the costumer.

Cost and quality, though, are not as directly related as the commerce depicts. It is not the raw amount of Gigabytes and Gigahertz that guarantee that any given IT active performs appropriately. Pricing and Computer performance is either cost or quality focused, is an amalgam of technical resources and personal capabilities. The variables involved in measuring an IT solution are so diverse that pricing can become very intricate (Duclós, 1983). Figure 3 signalizes some of the aspects of cost and quality for IT that might be ridden with subjectivity. Bias, in administrative decision, might lead to inappropriate investment. Inappropriate investment on IT may hinder corporative efforts, for, as previously seen, companies rely increasingly on IT.

Methodological process

The work presented here is an exploratory and expositive case study that aims to propose a method for creating a lead indicator for IT Actives Update. The creation of the indicator is proposed as a process composed of five steps: Strategic Statement, IT Policy Definition, Data Acquisition, Data Analysis and Graphic Presentation. Each of these steps is described in detail on this section.

The first step of creating an indicator, as presented by Kaplan and Norton (1997), understands company's strategies and how activities can affect them. Strategic statement is a general alignment between IT and Organizational management that will guide and help measure the success of the informational efforts of the indicator. In this work, company's needs show a growing dependency on IT, reflected on Figure 3. Figure 3 reflects the need to balance IT investment with IT quality displayed on the organization.

Once stated that the goal for IT management is to obtain "balance" between investment and resource keeping, it is possible to create a general IT policy for updating IT devices on the organization. The policy is to find an indicator to measure if any given IT active is still useful for the organization or must be updated. On this research, in order to provide a theoretical approach to the subject, the authors base the policy on Tannenbaum and Woodhull (2006), where a condition of concurrence may occur when an IT active performance measure is above 80%. Therefore, IT policy for this work is presented as "Maintain IT Strategic Indicator for Updating

IT devices below 80%”.

Data acquisition is a step that has strong technological aspects but must be referenced by a managerial perspective. Porter (2005) declares that IT professionals tend do comprehend companies analytically, or by the parts that compose the whole. Managers tend to hold a synthetic perspective, understanding businesses as a whole. This step is the collection of raw data about which performance measures are needed to indicate that costumers are satisfied with the service levels offered by IT departments. On this work, the authors used the software *Logman*, from Microsoft Corporation, to acquire the critical data. The data acquired on this work is derived from both Von Newman (1946) computer architecture and current best practices for critical IT processes (Laudon & Laudon, 2004). Figure 4 shows the syntax used on *logman* software as well as the contents for a configuration file.

```
Logman stop counter %username%
Logman delete counter %username%
“Logman create counter %username% -cf –si 00:00:30
\\srv01\netlogon\perfcounter.txt -o \\srv01\perflogs$\%username% -f csv”
Logman start counter %username%

Perfcounter.txt
"\Network Interface(*)\Bytes Total/sec"
"\LogicalDisk(_Total)\% Free Space"
"\Memory\% Committed Bytes In Use"
"\Processor(_Total)\% Processor Time"
"\Process(excel)\% Processor Time"
"\Process(firefox)\% Processor Time"
"\Process(iexplore)\% Processor Time"
"\Process(msimn)\% Processor Time"
"\Process(msnmsgr)\% Processor Time"
"\Process(outlook)\% Processor Time"
"\Process(sapiens)\% Processor Time"
"\Process(system)\% Processor Time"
"\Process(winword)\% Processor Time"
```

Figure 4: Typical Syntax for *Logman* Software

Data acquired on the previous step is generated in the format “username.csv”. This data is composed of percentile values for each of the performance dimensions. By employing SPSS software, the authors first perform a factor analysis, discovering the contribution levels for each of the performance dimensions. Then, indicator values are calculated for each of the interactions. As a set of indicator values is generated, moving average and standard deviation are taken into account to provide a current value and a tendency value for the indicator. Finally, the indicator values can be generated for groups of machines, allowing better decision making regarding it actives update.

The data analyzed provides three values and a graphic, presented on Data Analysis Section. The three values are the current and tendency indicator values already mentioned and the last one is the result of Kaiser-Meyer-Olkin, KMO, and test of sampling adequacy. Values higher then 0.6 points are adequate, and lower indicate that there is a need to acquire further data

for a given group or active. The graphic representation allows an easy perception of “what is used in a given active” and “how this active is performing with this resources”.

Data Analysis

On the data analysis section it is presented three samples of the graphic presentation of the Lead indicator for IT actives update. Figure 2 is a case of a single machine, with adequate Bartlett’s values, Figure 3 presents a case of an inadequate sample and the Figure 4 shows the indicator for a group of servers in the subject organization.

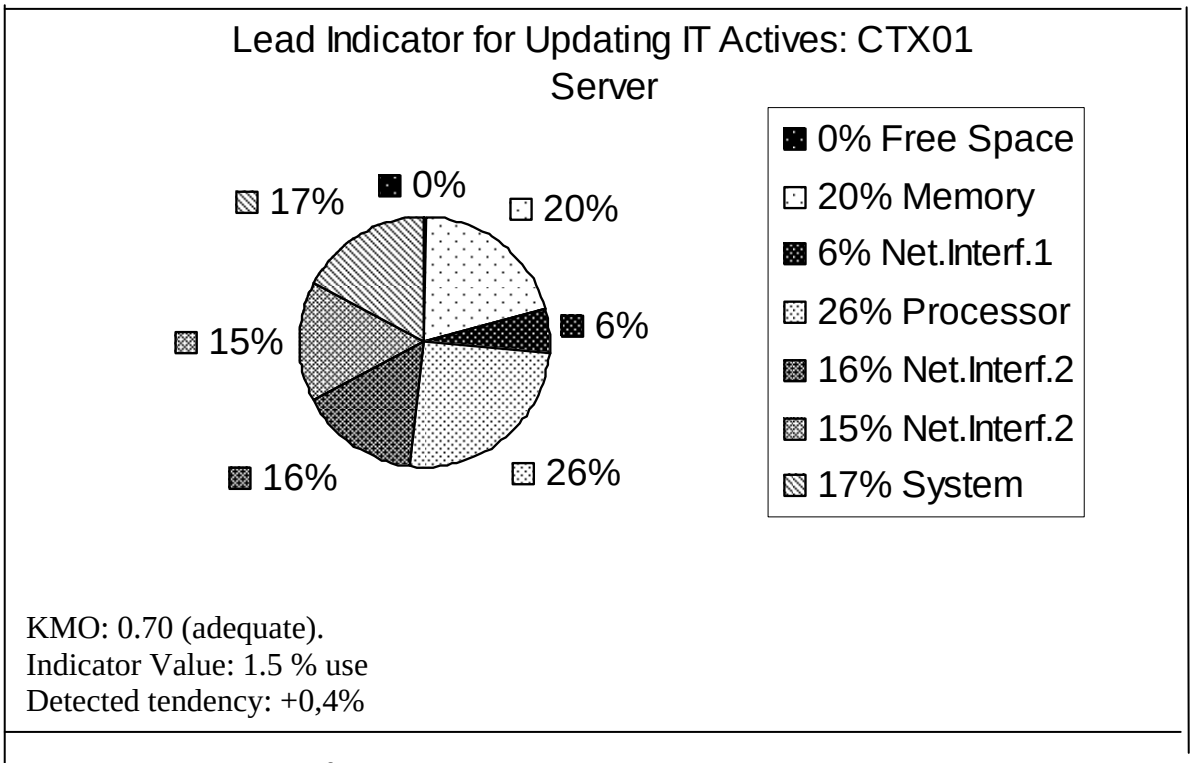

Figure 5: Lead Indicator for IT Actives Update: CTX01 Server

In Figure 5 it can be seen that performance, for the CTX01 server, is mainly composed of processor, memory and the usage of System process. Also, the sample has demonstrated adequate KMO values. The indicator points only 1,5% of use, but displays a tendency for growth. Two decisions can be extracted from this format: first, the active has resources available, which means that this active is capable of engaging in more data processing activities. Also, the dimension that is going to reach critical levels is probably the “Processor” dimension.

Figure 6 presents a case where data is insufficient, from a statistical perspective, to create a proper index. In this case, it is recommended that more data is acquired. Despite the low KMO level it is still possible to create an lead indicator, showing that performance, in this case, is mainly processor, MS Messenger and MS Outlook usage, with 6,07% of use and a +0,8% tendency of growth.

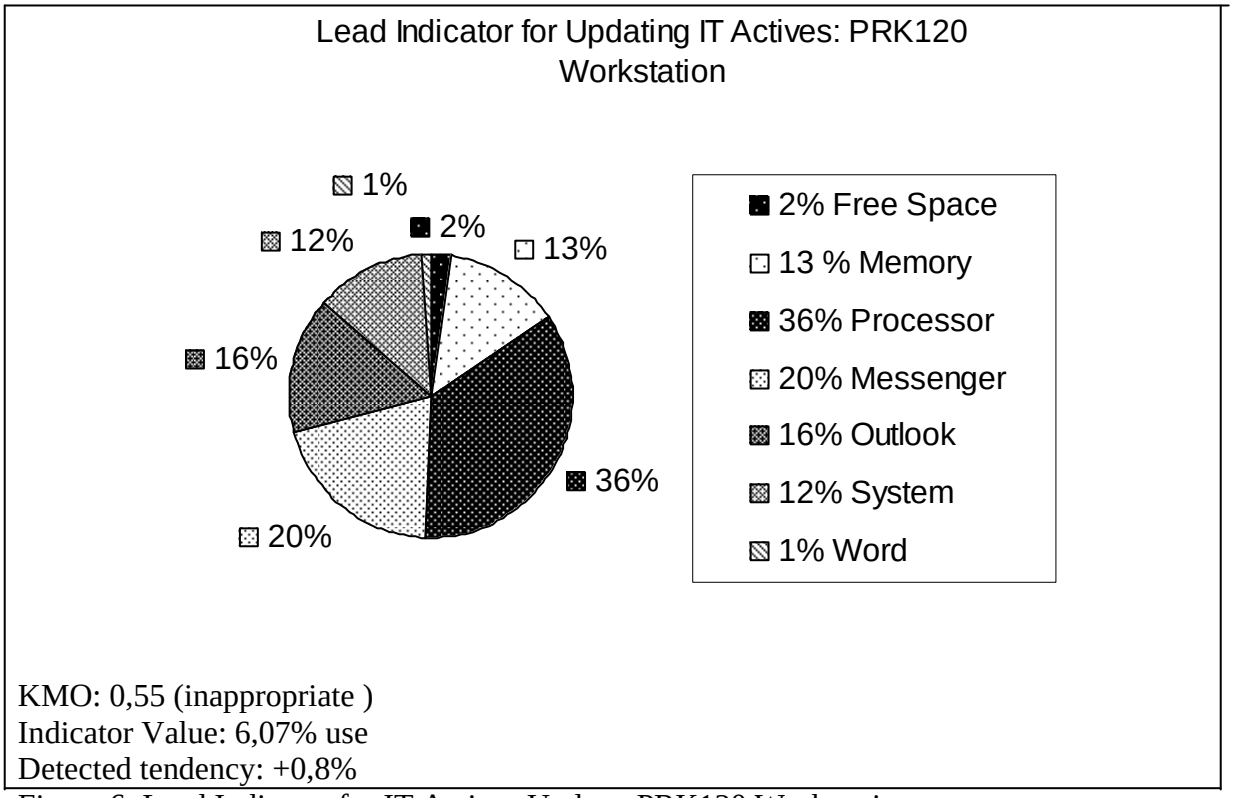

Figure 6: Lead Indicator for IT Actives Update: PRK120 Workstation

Figure 7 is the presentation of the composition of indicators that represent the servers in the subject company. It is clear that, in this company, server performance is composed mainly of space and memory, followed by network use. Proposing the use for a lead indicator for a group of different servers is useful to help in expanding the server group, showing that new servers should have large disk storage and abundant memory, with network processing power being the third most significant perspective.

Final Considerations

This proposition of a lead indicator for IT actives update aims to help managers to better understand where and how company's IT resources are consumed. By better understanding the use of resources, it is possible to better prepare for future needs. The Lead Indicator can be employed by a series of management methodologies, from BSC to Tableau d´ Board, as well as being a sole indicative of service level for IT Service Management methodologies.

The five steps used to create the indicator, Strategic Statement, IT Policy Determination, Data Acquisition, Data Analysis and Graphic presentation can be adapted to better suit each company's needs. Simplification of the results with the graphical presentation might contribute to broaden the understanding of managerial levels about IT actives components. Concurrently, tendency levels might help IT to better understand organizational needs.

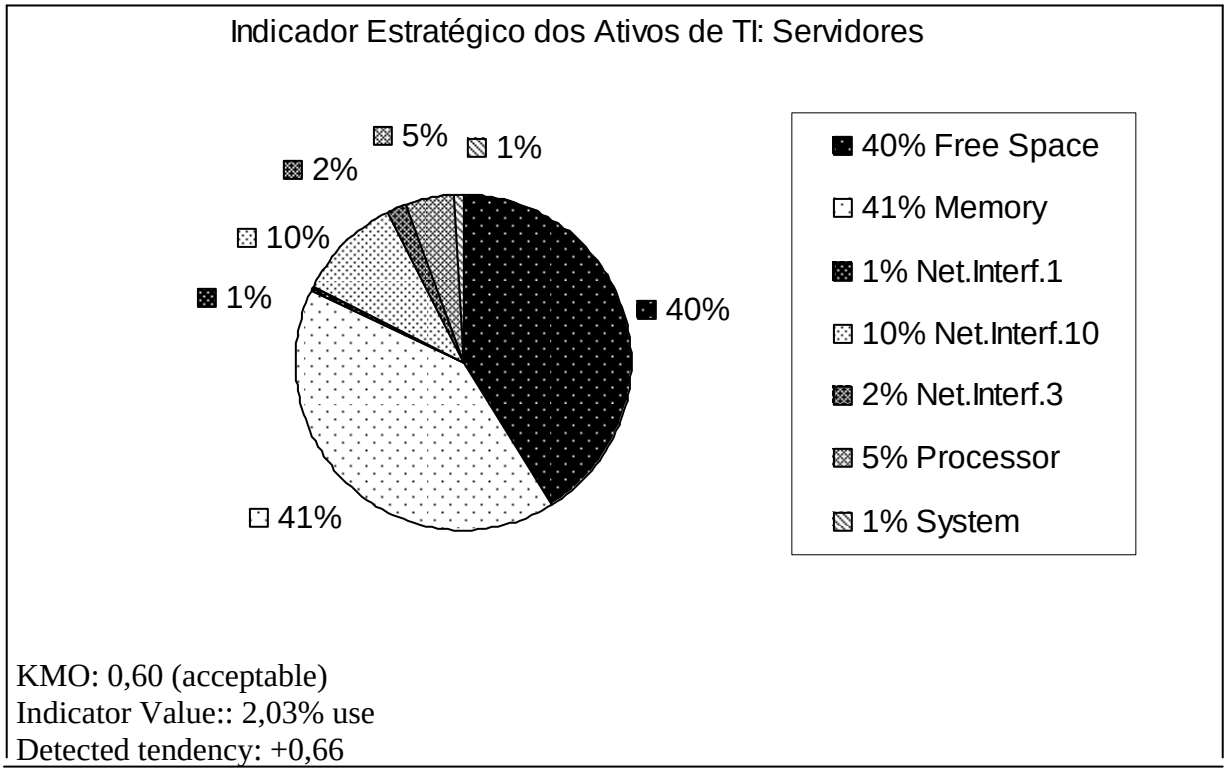

Figure 7: Lead Indicator for IT Active Update: Servers Group

This work is an exploratory attempt to combat subjectivity on decision making for its IT actives update. Several routes can be taken, from this work, to improve the research. Searching better statistical methods for analyzing the trends, employing different and more specific tools to acquire higher level resource use data and better, more aligned, IT management policies might be interesting. Another possible line for enhancing this research is the proposition of confidence levels for the lead indicator, in order to produce intervals of possible values for each active and group.

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