



## **CENTRUM Católica's Working Paper Series**

**No. 2015-11-0025 / November 2015**

**Urgent! ... To reward the innovation on information technologies, with a real focus on the value generation**

Emigdio Alfaro

**CENTRUM Católica Graduate Business School  
Pontificia Universidad Católica del Perú**

Working papers are in draft form. This working paper is distributed for purposes of comment and discussion only. It may not be reproduced without permission of the author(s).

## **Urgent! ... To reward the innovation on information technologies, with a real focus on the value generation**

Emigdio Alfaro  
CENTRUM Católica Graduate Business School  
Pontificia Universidad Católica del Perú, Lima, Peru

The innovation on information technologies (IT) is commonly treated as a purpose by itself; however, with this point of view, the managers, especially the chief technology officers or IT managers, don't necessarily take into account the value generation of the information technologies for the organizations in whose this type of operations and projects are developed and implemented, with the consequent loss of value. In this paper, a logic sequence for evaluating the value generation of the innovations on information technologies is presented, which consists in the following themes: (1) How the organizations generate value?, (2) How the innovations on information technologies generate value?, and (3) How can the organizations calculate the value generation of innovations on information technologies? Finally, some conclusions and recommendations for future researches are presented.

### **1. How do the organizations generate value?**

In general manner, it is possible to say that only exist two types of organizations: for profit organizations (companies or firms, and corporations) and nonprofit organizations (committees, associations, foundations, and governmental institutions). Firms can be both private and public and nonprofit organizations include: non-governmental development organizations, universities established by law, religious institutions, public hospitals, ministries, regional governments, municipalities, among others. In this section will be explained the following themes: (a) the value generation of profit and nonprofit organizations, (b) common errors in the analysis of the value generation of the investments or expenses of projects and operations, and (c) the management indicators of the value creation of the organizations.

#### ***1.1 The value generation of profit and nonprofit organizations***

Over the basis of the analysis of Goldratt and Cox (1984), both for profit organizations and nonprofit organizations, must meet the needs of at least three groups of stakeholders:

- A. Shareholders (in the case of profit organizations or firms) or Founders (in the case of nonprofit organizations). It is clear that shareholders have invested their money for obtaining more money. In the case of the founders of a nonprofit organization, they seek recognition through the improvement of the satisfaction of a certain type of need according to the subject area of benefit to the target population, which can clearly be seen in the non-governmental development organizations, which is the name of the official nonprofit organizations with can receive funds of the international cooperation through the government offices, according to the laws of the some countries.
- B. Market (in the case of firms) or target population (in the case of nonprofit organizations). For the firms, the market is composed by the current and potential customers, the intermediate consumers and the end users (end consumers), whom have needs that must be satisfied. In the case of nonprofit organizations, the market is the target population for whom the projects will be implemented.

- C. Workers. If the needs of workers at all levels (managers, intermediate bosses, and workers without managerial positions) are not satisfied, sooner or later, the consequences will be shown. For summarizing the consequences, it is possible that dissatisfied staff will not support the achievement of organizational objectives and at the first opportunity will withdraw from the organization or even worse, will perform various actions considering their personal benefit (in an "ethical" or "unethical" manner) rather than the benefit of the organization.

### ***1.2 Common errors in the analysis of the value generation of the investments or expenses of projects and operations***

Before starting any project or operation in an organization, it is necessary to verify that really generate value with basic financial calculations in the case of firms. If the project will not generate value, why would we want to implement the project? Based on the analysis of Goldratt and Ptak (1999) and Avraham Goldratt's Institute (1999), commonly, the wrong reasons for implementing operations and projects, are the following:

- A. Managers have the budget and don't know in what else to spend it. This is a problem for public and private organizations.
- B. If managers don't spend the money of the budget of this year, then they will not have that money for next year. This problem is so common as the previous one, and both are closely related.
- C. It is a decision of the "top management". This issue would make that the words of the owners or the "top management" were sacrosanct or similar something. If top management decides something what is wrong, to highlight this error and to build the best solution to the problem together, are our responsibility as managers or employees without managerial position. Obviously, we must be prepared to do that, with the right technical and behavioral manner. To do it with the right manner, will come back congratulations and improvements in compensations for the promoters. Just think that we will have saved hundreds of thousands or millions of dollars to the firm. The arrival of these congratulations and awaited improvements would be logical; and if not, then we will highlight these achievements to get a new job.

Additionally to the analysis of Goldratt and Ptak (1999) and the Avraham Goldratt's Institute (1999), it is important to consider the lack of ethics. Commonly, the non-value projects or operations are carried out for unethical reasons of directors or managers, among them are the following: (a) the project will be conducted by a related company (owned by one of the shareholders or linked to one of the shareholders, commonly the chairman), (b) the managers or the promoters of the projects have received unethical incentives, and (c) the managers want to avoid or reduce potential liability for failures on operations or projects through the hiring of a provider with very high prices in their goods or services.

For nonprofit organizations, we should not develop projects that do not create value, although in this case the value is not financial. We must ensure that the proposed operations or projects will generate better health, education, security, nutrition, environmental protection, religious culture, etc. in the target populations, according to the purposes of the creations of those

organizations. Also, this value generation should be quantified. Some critic examples are the following:

- A. The value generation of the public hospitals, is measured by the increase of the number of attentions (consultations, clinical examinations, surgical operations, etc.); but not over the basis of the generation of better health units in people whom are treated in these hospitals.
- B. The value generation of the regular basic education is measured based on the number of students whom completed fifth year of high school; but it is not done according to whom finished fifth year of high school with better reading comprehension skills and ability to perform basic mathematical operations, indicators whose are very low in diverse countries.
- C. The value generation of religious institutions is measured in terms of the increase of the number of registered members; however, measurements of compliance with ethical and moral principles in their daily lives of enrolled people, are not taken into account.

Based on Avraham Goldratt's Institute (1999), it is important to consider that the continuous improvement and the value generation of the organizations are done with the workers; therefore, it is totally out of common sense logic, to claim that a group of workers being ordered to "to improve" in the first month, "to continue the improvement" in the second month, "to continue the improvement even more" in the third, the fourth, the fifth and the sixth month, then when they have been got or have been improved the goals after six months, were dismissed from the group of workers whom improved the operations or projects, because a manager thought that with fewer staff will achieve the same goals as before. There is no logic of common sense, due to this type of behavior delays or eliminates the continuous improvement; but it is the way in which the managers of many organizations behave commonly.

We must not forget that many operations and projects need the integration of various functional areas of an organization, in diverse cases. All senior management and the middle management should help projects to have their priorities according to the convenience of the organization and not for the convenience of some managers. Commonly, many managers "promote" the purchase or the development of operations or projects for their areas, avoiding the improvements of processes for priority areas of the organization before their own processes.

### ***1.3 The management indicators of the value creation of the organizations***

To continue, an explanation of the utility of the management indicators and the actions for contributing to the value generation, is presented:

- A. Sales and the payment of commissions of sales to the vendors. For example, a firm has a policy of giving 2% of the sales value to the salesmen, and due to that, all the vendors will try to sale the biggest amount. Imagine that salesmen A and B worked very hard and obtained sales of US\$ 100,000 and US\$ 80,000 respectively; therefore, salesman A obtained a commission of sales of  $2\% \times \text{US\$ } 100,000 = \text{US\$ } 2,000$  and salesman B obtained a commission of sales of  $2\% \times \text{US\$ } 80,000 = \text{US\$ } 1,600$ , an amount which is less than the obtained amount by the salesman A. After the analysis of the financial results of the period, the accounting analysis evidenced that the contribution margin of the vendor

A was US\$ 40,000 and the contribution margin of the salesman B was US\$ 50,000 (greater than the contribution margin of the salesman A); therefore it means that the firm gave a greater compensation to the salesman who generated the lower contribution margin for the firm. In the cases of the firms with this type of policy, the stimulus is inadequate due to that the policy must be the payment with the percentage of the contribution margin and must not the percentage of the sales.

- B. The payment of a percentage of the operating profit to the chief executive officer. The operating profit when is calculated with the absorbent cost system, has error in its definition, because it is considered the following formula:  $\text{Product's Unitary Cost} = \text{Product's Unitary Fixed Cost} + \text{Product's Unitary Variable Cost}$ ; also, the fixed unit cost is defined as total fixed cost between the number of produced units. This definition leads to believe (as the calculations express) that when double or triple the number of produced units, the operating profit increases due to that the Product's Unitary Fixed Cost is reduced, and as a consequence, the cost of sales and the gross profit increase. According to Noreen, Smith and Mackey (1995), the mathematical calculation of the Product's Unitary Fixed Cost didn't generate problems in the early twentieth century; but, now the problems are presented due to that the proportion of fixed costs has been increased significantly, contrary to the beginning of the twentieth century. Now, with the absorbent cost system, it is possible to believe that the firm has generated money when the firm has lost money really, due to the differences of fixed costs whose are not included into the cost of sales, are being introduced into the value of the inventory. This was a very common practice in the manufacturing firms of massive consumption since 1970s until mid of 1990s, due to that the chief executive officers generated fictitious profits for obtaining the commissions over the profits whose were received into their remunerations.
- C. Number of meetings or number of realized events, and the advance report about the awareness of an issue in the town. If we analyze the progress in raising awareness about a subject in the population, we should first evaluate if they know the subject and then if they applied solutions for this issue in the reality; however, indicators such as the number of meetings or the number of realized events, commonly appear on the operational plans or strategic plans of the organizations, as reflecting the number of people made aware; also, as progress in this regard, they are also reporting progress in the number of meetings or the number of realized events. This situation creates that the progress report of the operating plan, appear with a fulfillment according to the chronological progress which was planned initially; but it does not reflect real progress in the achievement of their purposes.
- D. Number of presented documents or presented reports, and the advance report of the achievement of a goal of the operating plan. If we check the progress for getting a goal of the operating plan, we should assess the progress on activities and projects that have been raised in the operating plan; however, in various organizations we can see that the number of presented documents or the number of presented reports for reporting progress, are regarded as synonyms of the progress in the implementation of the activities and projects of the operational plan. Similarly as described in the previous paragraph, this situation creates that the progress report of the operating plan, appear with a fulfillment according to the chronological progress which was planned initially; but it does not reflect real progress in the achievement of their purposes.

Also, based on the analysis of Avraham Goldratt's Institute (1999), the measurement of the value creation of the firms based on the coverage of needs of shareholders (to measure the amount of generated money) is easier than the measurement of the satisfaction of the market needs or the satisfaction of the workers. It doesn't mean that the satisfaction of the market needs or that the satisfaction of the workers, are less important. It is simply easier to have an objective parameter as the generation of money for measuring the management activity. The generation of money in this case, is not to the generation of net income accounting necessarily, due to it can be the generation of contribution margin (sales value minus variable costs of sales) or saving fixed costs. There are different types of indicators to measure the generation of financial value; but best suited for companies could be: the net present value calculated based on the direct cost, the Tobin's Q (ratio which is calculated dividing enterprise value in the market over the replacement value of assets) and return on investment (analyzed as the ROA - Return on Assets - or ROE - Return on Equity -).

In the case of nonprofit organizations, it is more objective that the performance has been measured based on the coverage of current or future needs of the target population to which the organizations are heading. This situation is more clear for nongovernmental development organizations whose have methodologies based on the logical framework, with clear parameters oriented to the expected results, before the beginning of the projects (something that many firms must imitate).

Commonly, we design a very detailed project plan for constructing an industrial plant or building. We should do something similar when we implement or develop any type of project. We must do a cash flow forecast for a planning horizon that is at least equal to the period of planning of the long-term strategy. To remember that the long-term concept is not static and has been related to the size of the organization, the economic sector, and the particular situation of the organization and may be perhaps 20 years, 5 years, 3 years, 2 years and 6 months, as cases of mining or oil companies, pharmaceutical companies, food manufacturing companies, high-tech enterprises and micro-enterprises, respectively.

Therefore, it is necessary to consider as inflows, the increases of contribution margins whose were generated by the project or the savings generated by the project. In addition, we must consider as outflows, to the investments and the expenses which were incurred by the project. Then we apply a calculation of the net present value of the net flow to a minimum attractive rate of return (discount rate). If you make money in a reasonable and attractive amount, very well; but, in the contrary case, really it does not make sense to run the project or to continue it. To spend that money on another operation or project, is better than waste it, and much less in these times when we really need the money.

## **2. How do the innovations on information technologies generate value?**

In this section, some considerations for understanding how the IT operations or the IT projects generate value, will be explained for profit organizations and for nonprofit organizations.

### ***2.1 In Profit Organizations***

In the BMI Information Technology Report Q4 2015, BMI Research indicated some innovative IT projects for profit organizations in some South America's countries, whose were the following:

A. For Peru, BMI Research (2015a) indicated that:

a. Peru To Launch E-Money Project.

In April 2015, the Asociación de Bancos del Perú (ASBANC, Associations of Banks of Peru) announced the Peruvian E-money Project, which will provide access to e-money services to five millions people by the end of 2020; also, Movistar Peru and MasterCard jointly launched Tu Dinero Móvil in January, service which enable Movistar users to send and receive money transfers, among other functionalities (p. 55).

It is important to take into account that e-money project in Peru requires the establishment of improvements in the IT infrastructure of the firms, in the available technology for the population, and in the production capacity of governmental entities. The use of the peruvian electronic document of national identification must be included in this solution due to security reasons. The additional inflows due to the interests or the fees for the use of the money, must be contrasted with the additional outflows due to the investments on IT infrastructure and the expenses on personnel, maintenance and other concepts.

b. Azteca Comunicaciones To Complete RDFO Project In 2016:

In November 2014, Azteca Comunicaciones announced that it expects to the deployment of its fibre optic backbone network (RDFO) in Peru in March 2016.” (p. 56). This project involves the installation and maintenance of 13,400 Km of fibre optics and around US\$ 760 millions, and will cover about 80% of the Peru’s territory. Also, it is important to consider that the evaluation of the additional inflows must include the additional contribution margin due to the new clients to whom the sales would be increased. Also, it is necessary to consider the savings in comparison with the previous technologies whose will be replaced with the RDFO.

c. Government Cloud Project (BMI Research, 2015a):

“Fonafe, a government holding of 33 state-owned companies in the utilities and finance sectors, is in the fourth year of a five-year partnership with IBM, launched in 2011, to develop and manage a private cloud infrastructure.” (p. 57). Peruvian Government’s expectation is that the project will save more than US\$ 4.2 millions over the five years, and 40% of operating cost reduction. Additionally, “The government also hopes that these savings will free more of the 10 state-owned-companies’ IT budgets for business development. Currently around 70% of the ICT budgets goes towards IT support, while 30% is used to develop the business.” (p. 57).

B. For Chile, BMI Research (2015b) indicated that:

a. Telefónica Opens New R&D Centre:

In December 2014, Spanish broadband and telecommunications provider Telefónica opened a new research and development (R&D) centre in Chile's capital Santiago. The R&D centre will focus on the development of Internet of Things technologies for

smart cities and smart industries (mining and agriculture) projects. The new facility was partially funded by Corfo, Chile's state development agency. (p. 53).

In this case, for evaluation the generation for the firm Telefónica, it is necessary to precise the scope of the development of Internet of Things technologies for smart cities and smart industries due to the amplitude of this theme. Also, it is necessary to evaluate the conditions of the infrastructure of the market for aligning to the improvements of the technologies.

b. SmartCity Santiago - Challenges And Opportunities:

In July 2014, a group consisting of Enersis (Enel) and Cilectra launched the SmartCity Santiago project with an investment of USD10mn, the first such smart city infrastructure project in the country. The SmartCity is located in northern Santiago, and will act as a laboratory for testing of technological solutions for regular activities in the city. Areas identified for testing include public transport, automated utilities and street lighting, telemonitoring and smart automation/control systems. The project is proposed to last three years, acting as a reference for wider smart infrastructure deployment. (p. 53)

c. Third Data Centre For Synapsis:

Local IT company Synapsis launched its third data centre in Chile in late 2013, boosting its coverage in the country to 1,100 square metres and increasing the number of racks from 340 to 500. The company invested USD26mn in the Tier 3 data centre. The data centre has also been built to 'anti-seismic' specifications and includes sustainable energy sources. (p. 54)

d. IBM Opens Santiago Data Centre:

“The new centre in San Bernado has a storage capacity of 22.8 petabytes, and, combined with the Providencia centre, the company has about 3,800km of fibre optics installed.” (p. 54). Also, it is important to remark that IBM invested around US\$ 22 millions (p. 54).

C. For Brazil, BMI Research (2015c) explained that “Big Data Becomes Big Business” (p. 72). This report described that according to the firm EMC, “The outlook for M2M and IoT in Brazil improved earlier this month, with the government lowering taxes on M2M SIM cards. EMC believes that the IoT concept will represent 10% of Brazil's total data traffic in 2020, up from just 2% in 2013.” (p. 72). IoT means Internet of Things and M2M is Machine-to-machine.

D. For Argentina, BMI Research (2015d) indicated that:

a. Data Network Investment To Enable New Services

In January 2015, Telecom Argentina will invest around ARS210mn (USD24.36mn) to deploy a new fibre optic backbone network based on the dense wavelength division multiplexing technology in the country. (p. 63)



Movistar announced in February 2015 its plans to invest ARS3bn (USD346.81mn) to deploy 4G LTE services in Buenos Aires Province. The operator aims to provide 4G technology in 53 municipalities by deploying more than 1,300 LTE sites across the province. Movistar currently provides 4G services in certain areas of the province including Buenos Aires, Mar del Plata, Cariló and Pinamar. (p. 63)

b. M2M Gaining Momentum

In December 2014, Argentina's mobile operator Telecom Personal entered a partnership with US-based firm Jasper to launch internet of things (IoT) and M2M connectivity for business subscribers. Enterprise subscribers will be allowed to access a highly scalable platform to launch, manage and monetise their connected services internationally, according to Jasper. IoT offers advanced connectivity of devices, systems and services that extend beyond M2M, and includes various protocols, domains and applications. Jasper has previously partnered with Claro, Telenor, Vimpelcom, Tele2, Telefónica, AT&T, KPN, NTT DoCoMo and Etisalat to launch M2M initiatives.

The IoT is expected to underpin telecom enterprise services offered across several sectors. The plans for connected devices will link transport, power and utilities to communications networks. Further to this, IoT plans will underpin retail and banking sectors as well as being linked to many other markets. Personal's focus on building an IoT platform will enable it to cater to these industries' growing needs. Many companies are turning to technology to lower costs and improve efficiency. Telecoms operators have many opportunities to build revenues from these new sources in addition to providing more traditional communications services. (p. 63)

E. For Colombia, BMI Research (2015f) indicated that:

a. LG CNS To Enhance Colombia ICT Collaboration

In April 2015, it was reported that LG subsidiary and IT services provider LG CNS was keen to boost ICT collaboration with Colombia. The South Korea-based company has revealed the 'Korea-Colombia ICT cooperation plan', which indicates that Korea's e-Government system will be launched in Colombia following LG CNS' successful launch of an e-ticket system in the capital of Bogotá. The plan will also help the company make inroads into other Latin American markets such as Chile, Brazil, Peru and Mexico. (p. 57)

b. Internet.org Enters Colombia

In January 2015, US-based social networking site Facebook announced its plan to enter an agreement with Colombia-based telecoms operator Tigo to introduce its internet.org initiative in the local market. Facebook set up the internet.org initiative with the main aim of connecting billions of people in regions that do not yet have internet access. Through this initiative, Facebook will team up with telecoms operators in different countries to provide internet access at a more affordable price. Facebook may also sign additional agreements with other telecom operators in the country. (p. 58)

Based on Alfaro (2012), for the cases of profit organizations, some detailed information technologies with the elements that should be considered for the analysis of the financial value generation of their acquisition and implementation, is presented:

- A. IP telephony. In the acquisition and implementation of IP telephony, the savings of the costs of phone calls between the subsidiaries of organization and the savings of calls to other telephones of suppliers or customers (phone calls to national or international organizations or people inside or outside the country), must be considered. With IP telephony, the savings of the organization are possible when the other parts of the communications have also IP Telephony; however, these savings should be higher than the cost of the IP telephony center, the IP telephones as extensions, the improved wiring (if required) and maintenance costs. Also, it is important to consider that if the current situation is that the phone calls are missed due to that exist problems with the telephone central and occurred the loss of sales, then the additional sales that would be obtained with the IP telephony must be included. Otherwise, a financial return would not be possible and only obtain an increase of the outflows.
- B. Information System for taking Pre-Sale Orders. This system allows the increase of sales, due to that it allows sellers - under the form of pre-sale – to take orders directly through cell phones. This system allows the checking of the stocks of the orders and the checking of the customer credit, in an online manner, before to close the sale. Sales increase, as it can reach more customers faster and at the same time, avoiding loss of sales, since, in the massive consumption of goods, it is common for a product to be replaced by a similar one from another vendor if fails to comply with the order within the customer expectations. This system also allows the savings of forms through which the order is entered through the cell phone (although this is not significant savings in comparison to the amount of sales). Also, the investment on the acquisition or implementation of the information system as well as the charges for internet services via cell phone, information system maintenance and long life battery, must be considered in the calculations of the generated value.
- C. Information System for controlling Visits of Promoters. This system allows the reduction of theft of product samples and promotional items that should have been delivered to customers by the promoters. It should take into account that some promoters commonly do not return the product samples and promotional items, because they want to avoid the evidences about they were not working, and due to that, they give away or consume them, or, in some occasions, use them for illegal sale. When a better control of the delivery of product samples and promotional items is established, the firm can not only save on these concepts, but more deliveries occur with a consequent increase in the sales, due to that this delivery affects directly to the purchase of the customer.
- D. Virtual Shop. In the acquisition and implementation of an online store, you should consider additional contribution margin which will result from the increase of sales of the company, although it is likely that no savings arise, but investments and expenses increase, because it is an additional sales channel. In this case, in addition to the technological aspects, it must take into account various aspects of management (marketing, sales, production, distribution, etc.), whose will directly influence on the investments and expenses.

- E. ERP Information System. Investments and expenses that could be generated by a project of acquisition and implementation of an ERP (Enterprise Resources Planning) information system -especially World Class ERP- can be very high. The financial benefits of an ERP information system, could be associated with the following:
- a. Additional contribution margin due to the increase of the customer loyalty and the increase of the number of customers as a result of a better quality of service. This increase of value takes the form of reductions in delivery times, faster elaboration of quotes for the clients, more available time for contacting more clients, etc.
  - b. Savings on the following concepts: penalties for failing to deliver orders on time, discounts which were gave to customers for being well in the case of delays in the delivery of orders, to avoid unnecessary purchases, discounts for purchases with larger volume, downsizing, reduction of inventories and reduction of financial costs.
  - c. Additional investments: hardware for servers, hardware for end-users, basic software licenses for servers, basic software licenses for users, ERP information system, information system upgrades of the ERP information systems, interfaces of the ERP information systems with the legacy software, etc.
  - d. Additional expenses: maintenance of the information system, additional technical personnel whom know the new technologies whose came with the new ERP information system, additional users that know the use of the new ERP information system or other similar information system, etc.

As was shown, the financial benefits of the innovations on information technologies in the firms could be diverse only if we know how to identify and how to calculate the financial value generation; otherwise, good results would be only luck. The lack of an adequate analysis of the value generation would bring unnecessary and significant costs that would be assumed by the firms.

## ***2.2 In Nonprofit Organizations***

In the BMI Information Technology Report Q4 2015, BMI Research indicated some innovative IT projects for nonprofit organizations in some South America's countries, whose were the following:

- A. For Peru, BMI Research (2015b) indicated that:
- a. Indecopi Targets Piracy Rate Reduction: "In July 2015, the National Institute for the Defense of Competition and Protection of Intellectual Property (Indecopi), working with the Peruvian Tax Police and private enterprises, introduced several measures to reduce the incidence of software piracy" (p. 55).
  - b. Digital Inclusion Programme Targets Coca Growing Region: "In March 2013, the government of Peru launched a programme to promote digital inclusion in the coca growing south east of the country." (p. 56). This project is a pilot which includes 150 people across the Pichari and Kimbiri districts, whom receive basic training about IT hardware, software, Internet, and the manners in whose the community could apply

these technologies for entrepreneurial projects, considering a total of eight telecentres in the south-east region.

- c. Tablets For Schools: “In March 2015, it was announced that public schools in four regions in Peru - namely Lambayeque, Huancavelica, Apurímac and Ayacucho - would receive a total of 410,570 tablets as part of a concession contract to operate a fibre optic network.” (p. 58) (BMI Research, 2015a). In this case, it is necessary to consider the need of contents for the equipment, due to that the equipment by itself is not sufficient to educate to the population.

Also, some additional innovative projects which were developed in Soluciones Prácticas and ONGEI are presented:

- a. In Soluciones Prácticas, a nongovernmental organization, the following innovative information technologies were developed: (i) implementation of communication networks in rural zones, (ii) installation of informatics equipment in rural zones without electric energy, (iii) installation of Internet access in rural zones without electric energy, (iv) digital literacy (project for teaching information technologies to people in rural zones), and (v) modules for improving the governability of municipalities through the improvement of internal management, participation of citizens, and transparency in accountability (Soluciones Prácticas, 2015a). This nonprofit organization is focused on the investments on technologies for improving the social conditions of the populations in whom worked with projects.
- b. In ONGEI (National Office of Electronic Government) of Peru, the following innovation information technologies were developed:
  - i. Peruvian State Portal, portal with the maximum hierarchy in Internet in which all the entities of the Peruvian State must appear, and which currently has 1112 entities are publishing their information.
  - ii. Citizenship Service Portal, portal with 42,001 governmental procedures (821 governmental procedures are online in 62 entities) and with publications of 1042 governmental entities of the three governmental levels.
  - iii. Transparency Portal, portal with publications about the planning, the organization, the procedures, etc., whose contributed to the transparency of the Peruvian State.
  - iv. Public Software Portal, portal with 112 software applications whose were developed and published by 30 governmental entities, for sharing their benefits.
  - v. Municipal Portals, 559 free portals which are administrated by municipalities in the diverse parts of Peru.
  - vi. Catalog of Mobile Applications of diverse governmental entities of Peru, with access to the information of 31 mobile applications.
  - vii. Portal for creating firms in 72 hours, with more than 60,000 created firms and more than US\$ 5 millions of savings for the citizens of the cities of Lima, Callao, San Martín and Lambayeque, and which was transferred to SUNARP (National Superintendency of Public Registers of Peru) at September 13<sup>th</sup>, 2014.
  - viii. Portal against Discrimination, with processes which relate 11 ministers against discrimination.

- ix. Interoperability platform of the Peruvian State, with 24 web services whose are used by 54 governmental entities.
- x. System of Electronic Notifications of the Poder Judicial del Perú (Judicial Power of Peru).
- xi. System of Online Medical Appointments for Ministerio de Salud del Perú (Health Ministry of Peru) (ONGEI, 2015).

The measurement of the benefits of the ONGEI's IT projects are focused on the improvement of the governmental processes and the improvement of the defense of the rights for the people. It is important to consider that the investments and the expenses on IT processing capacity, must be compared with other similar solutions whose obtain similar technological benefits; however, it is possible that the government could invest money without sufficient benefits for justifying the project.

B. For Chile, BMI Research (2015b) indicated that:

Start-Up Chile: "Start-Up Chile is a prominent start-up accelerator based in Santiago, Chile, that provides equity-free investment for start-ups. The programme was launched by the government via the InnovaChile programme and receives financial input from the Ministry of the Economy, Ministry of Foreign Relations and Ministry of the Interior. Start-Up Chile held its first English language weekend, with 11 businesses created in a 54-hour period of pitches and meetings." (p. 55).

C. For Brazil, BMI Research (2015c) indicated that:

a. Digital City Network Expanding

In March 2015, Brazil's Minister of Communications Ricardo Berzoini opened a digital city in Toledo in the state of Paraná. The digital city, which is the second in the state, comprises a fibre-optic ring of 14km, connecting 18 agencies and four public access sites. The project forms part of a BRL680,000 (USD192,046) investment that will benefit 128,000 residents. The country has 43 digital cities across all regions. The programme seeks to modernise local management, boost access to public services and promote the development of municipalities in the country using technology.

In January 2015, the Brazilian Ministry of Communications announced BRL7mn (USD2.71mn) to establish a new digital content development centre in São Paulo, Brazil. The facility will be operated with the cultural department of the city and will provide workshops, studios and labs for small businesses to create videos, music, games and apps. The centre will be set up with the Casa de Cultura at a site managed by SPCine, a São Paulo-based finance investment initiative. (p. 71)

b. Big Data Adopted For Urban Mobility Challenges

In August 2014, Brazil's São Paulo state transport agency Artesp, in collaboration with IBM, opened an information control centre (CCI) to oversee its 6,000km of highways. Artesp is investing BRL28mn in the centre, which will offer data management and mobility technologies provided by IBM and implemented by IT integrator and consulting firm Magna Systems. The CCI will collect data from 19 control centres operating on 30 roads in São Paulo, according to Artesp.

The CCI will rely on Big Data systems to collect and monitor traffic volume, toll data and information captured by cameras, sensors and weather stations to assess the quality of roads and safety for users of the highways. Information is centralised in the CCI and analysed in real time, generating rapid responses and insights for decision-making. IBM already has experience with intelligent transport management through its traffic control centre in Vietnam, where it looks to prevent congestion and coordinate responses to accidents and adverse weather. (p. 73)

c. Smart Cities Initiatives Cater To Urbanization:

Microsoft announced its first smart city deal in Brazil, as part of its CityNext initiative. The first contracts have been agreed with the Minas Gerais state government, with 23 other contracts signed with government institutions.” (p. 74). Also, “The deal with Minas Gerais marks Microsoft's first smart city contract in Brazil, although it has been providing other services to government entities for over 20 years. Its first contracts include providing the state government with Microsoft's Sharepoint, SQL server, Hyper-V and Windows 8 solutions, among others. Microsoft has built 'Big Data' applications for each of these systems in order to improve the management of information generated in 28 public services centres across the state. (p. 74).

D. For Venezuela, BMI Research (2015e) indicated that:

a. State Production Of Computers

Former president Hugo Chávez's government's focus on economic autonomy underpinned major efforts to encourage domestic production of computers. In October 2009, Empreven, an organisation of Venezuelan entrepreneurs, launched plans to build a new PC manufacturing plant in Coroza, in the state of Zulia. The project received an initial investment of USD12.5mn, with production initially on a small scale. The money came from social funds generated by Venezuela's state oil company *Petróleos de Venezuela*, in line with the science, technology and innovation law known as *Locti*, and from *Petrolera Sino Venezolana*.

In November 2007, production started at a new IT facility set up by Venezuela's national IT guiding body CENIT, with the capacity to produce 5,000 computers a month. The government earmarked USD2.3mn to spend on the new facility, which complements the production capacity of state-owned IT company *Venezolana de Industria Tecnológica (VIT)*.

In June 2013, President Nicolás Maduro presented one of three tablets produced by VIT, with prices ranging from VEF2,950 (USD470) to VEF4,233. The Vergatario tablet follows on from the production of the Vergatario phone, which was aimed at making handsets affordable to the mass market in Venezuela. However, with the price listed on the VIT website, the tablets are unlikely to make an immediate impact on the market. (p. 55)

b. All Government Services To Be Digitized By 2016

In March 2014, Science, Technology and Innovation Minister Manuel Fernández announced that the government was planning to digitise all its services by 2016. He reported that of the 805 separate government services offered in March 2014, 158 were available online. The ministry expects a further 250 services to be made available online in 2014, with around 400 expected to be added in 2015. The announcement follows e-government legislation passed in 2013 that obligated public sector institutions to use information technology in their internal management processes, as well as in relations with other state entities and citizens. (p. 56)

c. Venezuela And Argentina Cooperate On Open Source Software.

In February 2014, Venezuela's ICT ministry announced it was cooperating on the development of open source software with Argentina. The cooperation includes the meeting of the development teams of Argentina's Huayra and Venezuela's Canaima GNU/Linux operating systems to exchange knowledge and experience. Argentina launched the Huayra project in March 2014, based on Linux and used on the notebooks provided to schools and students as part of its digital inclusion programme Conectar Igualdad. Meanwhile, Venezuela's Canaima GNU/Linux is used in 51% of the government's workstations as well as part of the Canaima Educativo programme. (p. 56)

An open source project is important for saving unnecessary costs due to the investment on licensed software, and in many cases, the open source and free software demonstrated better performance than the licensed software. The governments must consider seriously the implementations of similar projects in diverse countries.

d. Automation Of Canaima Production Lines Boosts Output.

In May 2015, it was reported that a delegation was working with the Canaima production facility in La Carlota, Caracas, to automate the production process and enable increased output. The Chinese delegation will stay for three months, according to local press reports, and will enable production to be boosted to 500,000 PC units. The refit will create three to four production lines and capacity for another 100 employees, unlocking greater flexibility. Production will diversify and the facility will increase its capacity to 500,000 notebooks as well as 600,000 tablets and 100,000 decoders for the Open Digital Television standard.

The Canaima programme began in January 2011 with the aim of increasing access to technology for the majority of Venezuelans and in 2013 was ranked as the 14th largest PC vendor globally by unit shipments. By 2012, it had delivered around 2mn PCs, with the aim of a distributing a further 2.5mn by 2015 to ensure all school students in the country had access to a notebook. In earlier phases of the project, the government was reliant on imported hardware, but since the creation of a production facility in 2012 in Miranda state the government has been aiming to increase output and by 2015 operated three production facilities. (p. 55)

E. For Colombia, BMI Research (2015b) indicated that:

a. New Smart Cities Push

Medellín, Colombia's second largest city, has won awards for its smart city initiatives, a trend the ICT ministry MinTIC intends to extend. Colombia's increasingly urbanised population creates greater need for IT-driven management tools to aid in policies such as the smooth running of public transport and local government initiatives. Government support of smart cities is clear in Colombia where MinTIC has set up a portal to encourage companies to invest in smart cities. With the urban population accounting for three quarters of Colombia's inhabitants, a proportion forecast to rise to 84% in 2050, there is a definite demand for smarter cities.

The seven cities selected for smart city development are predominantly located in areas that already have high internet penetration, making them prime candidates for investment. The cities are: Manizales, Armenia, Pereira, Montería, Bucaramanga, Cali and Barranquilla, the next largest cities in Colombia after capital Bogotá and Medellín.

The greatest opportunities for smart cities lie in the larger urban areas where high population density causes a myriad of problems. Managing traffic is one practical application as well as installing sensors to show demand and make more efficient use of electricity. Other applications such as rubbish bins alerting when they are nearly full, water leaks being identified quickly or generating noise maps have implications for the development of cities. Colombia's increasing urbanisation, as well as its' growing population create the need for different city management strategies that will rely on technologies and connections. (p. 57)

#### b. Computers For Education

The government programme Computadores para Educar (Computers for Education), begun in 2000, continues as part of the Vive Digital strategy. The programme is administered by MinTIC in conjunction with the international One Laptop Per Child (OPLC) initiative, helping to supply affordable computers for public schools. The programme aimed to achieve 100% connectivity in schools and public access terminals and to reach an average ratio of 12 children per computer by 2014.

In April 2014, Deputy ICT Minister Carolina Hoyos Turbay announced that the Colombian government had made investments of COP645bn in ICT since 2010. The bulk of the spending was directed towards computers for education. More than COP207bn was for the delivery of 202,126 computers, with 188,533 PCs (127,558 contributed by MinTIC and 60,975 by local authorities) and 13,593 tablets (9,510 contributed by MinTIC, 4,083 by local authorities).

In June 2014, MinTIC held a public auction for the supply of 101,771 notebooks to be distributed to children in Colombia. The government was given a budget of COP53.5bn, but acquired the notebooks for 46.4% less than market prices. The winning tenders were received from Compumax and Heritage Group. (p. 58)

As was mentioned in a similar case, the development of contents is critical for the success of this project. It is necessary to develop material for being introduced into the computers.



In the diverse cases whose were mentioned in this section, the value generation must be measured through the benefits to the target population, which would be the benefits to people, firms in an economic sector, governmental entities, or firms or people in a country. The IT can not generate benefits by itself, and it is necessary the development of the conditions for generating the benefits, whose are commonly related to non IT characteristics.

It is necessary that the investments of the governments must be evaluated considering the financial and the nonfinancial benefits; however, the nonfinancial benefits as were described, are the main benefits, due to the nature of nonprofit organizations. Also, the amount of investments must not so high that could not compensate the benefits to the population, in comparison with other solutions for justifying the project. Also, the improvement of processes, the saving of time and money, and other benefits, could be calculated in terms of the generation of gross domestic product for the country.

### **3. How can the organizations calculate the value generation of innovations on information technologies?**

In the previous sections, the concepts about How do the organizations create value? and How do the innovations on information technologies create value? were presented. Now, the question is How can the organizations calculate the value generation of innovations on information technologies? The theory about it was previously developed; however, the components of that theory are not integrated. In respect, the Global Status Report on the Governance of Enterprise IT of 2011, showed that “Difficulty demonstrating value and benefits” is one of the challenges in implementing GEIT (Governance of Enterprise IT) mechanisms, according to the 30.3% of the 834 executives whom were interviewed in 21 countries across the globe (IT Governance Institute & PriceWaterhouseCoopers, 2009). Also, after a research in which more than 250 executives were interviewed in 22 countries, about the evaluation of the value generation of the information technologies, the IT Governance Institute and PriceWaterhouseCoopers (2009) indicated that:

The survey indicated that a surprising number of enterprises do not measure the value of their IT investments after the fact. Just slightly more than half of the respondents—56 percent—indicated that their enterprise does measure the value of IT investments, and 43 percent said no such measurement is made. Although executive management is generally convinced of the value of IT investments, it is unclear how 43 percent determine whether the expected value has been achieved. Those who do measure the value of IT investments rely primarily on profit and loss calculation (42 percent). (p. 12)

In the practice, the majority of organizations didn't evaluate the value generation of the innovations on information technologies due to that the managers had not have an integrated methodology for evaluating the IT operations and the IT projects, previously to the beginning of the new IT operations and the new IT projects. For contributing to the solution of this problem, MEVGIT is a proposed methodology for avoiding the pitfalls related to the value generation of IT innovative projects or IT innovative operations. The theoretical framework for evaluating the value generation of information technologies, which is inside MEVGIT, includes the following: (a) free cash flow (Chih-Chang, 2013; Kousenidis, 2006), (b) direct costing (Klychova, Zakirova, Zakirov & Valieva, 2015; Iotti & Bonazzi, 2014), (c) total cost of ownership (Bibo, 2014; Laudon & Laudon, 2012), and (d) the procedure 59 of the MAIGTI

methodology (Alfaro, 2011), which is a methodology for integral auditing of the management of the information technologies.

### **3.1 Free Cash Flow**

Alfaro (2015) cited to Chih-Chang (2013) and Kousenidis (2006), whom explained the concept of the free cash flow. In respect, Alfaro (2015) indicated that:

Chih-Chang (2013) indicated that free cash flow is “the balance of cash inflows and outflows” (p. 1). Also, Chih-Chang (2013) explained that free cash flow indicates “the ability of corporations to expand, and is commonly known by stock market analysts as capital expenditures” (p. 1). (p. 21)

Also, citing to Kousenidis (2006), Alfaro (2015) wrote:

Kousenidis (2006) explained that the majority of finance text books defined free cash flow as follows: “the after tax operating earnings of a company plus non-cash charges less investment in working capital, property, plant and equipment, and other assets (Copeland et al., 1991).” (p. 649); also, indicated that free cash flow “requires that cash flow does not incorporate any financing-related cash flows, such as interest expense or dividends.” (p. 649). (p. 21)

### **3.2 Direct Costing**

Alfaro (2015) cited to Klychova, Zakirova, Zakirov and Valieva (2015), and Iotti and Bonazzi (2014) whom explained the concept of the direct costing. In respect, Alfaro (2015) indicated that:

Klychova, Zakirova, Zakirov and Valieva (2015) indicated that “is intended to include in the cost of production and ending stocks estimate only variable production costs and allocation on financial result of the total amount of fixed costs without distribution by product types.” (p. 308). Also, Klychova et al (2015) explained that: “The purpose of this method is increasing the speed of decision-making on pricing and possibility of analyzing the relationship of the costs, volume of production (sales) of products and profit (CVP-analysis) as well as analysis of break-even point.” (p. 308). (p. 21)

Also, citing to Iotti and Bonazzi (2014), Alfaro (2015) wrote:

Iotti and Bonazzi (2014) explained that “The direct costing assigns only the costs directly attributable to the individual productions, while overhead costs are not allocated and are briefly summarized at the close of the reclassified income statement.” (p. 1492). (p. 21)

### **3.3 Total Cost of Ownership**

Alfaro (2015) cited to Bibo (2014) and Laudon and Laudon (2012) whom explained the concept of the Total Cost of Ownership. In respect, Alfaro (2015) indicated that: “Bibo (2014) explained that the Total Cost of Ownership (TCO) is ‘a technique which can be used to make sure that all associated costs over a given time period are considered.’ (p. 89).” (p. 21). Also, citing to Laudon and Laudon (2012), Alfaro (2015) wrote:

Laudon and Laudon (2012) indicated that the total cost of ownership of technology assets, must include:

- A. Hardware acquisition: purchase price of computer hardware equipment, including computers, terminals, storage, and printers
- B. Software acquisition: Purchase or license of software for each user
- C. Installation: Cost to install computers and software
- D. Training: Cost to provide training for information systems specialists and end users
- E. Support: Cost to provide ongoing technical support, help desks, and so forth
- F. Maintenance: Cost to upgrade the hardware and software
- G. Infrastructure: Cost to acquire, maintain, and support related infrastructure, such as networks and specialized equipment (including storage backup units)
- H. Downtime: Cost of lost productivity if hardware or software failures cause the system to be unavailable for processing and user tasks
- I. Space and energy: Real estate and utility costs for housing and providing power for the technology. (p. 196) (p. 21)

### **3.4 MAIGTI's Procedure 59: Procedure for auditing the value generation of IT Projects**

Alfaro (2011) explained the steps of the Procedure 59 of the MAIGTI methodology, whose were developed for auditing the financial value generation of the IT projects. Also, applying an adaptation of the MAIGTI's Procedure 59, Sosa and Alfaro (2011) evaluated the value generation of the implementation of a module of an information system for the sales of the delivery of packages, and found that with an investment of US\$ 24,620.71, the net present value after three years were US\$ 413,683 with a discount rate of 25%. According to Alfaro (2011), the original steps of the MAIGTI's Procedure 59 were the following:

- A. To review the methodology for the calculation of the value generation of the IT projects, and the calculations of the value generation of all IT projects.
- B. To review the definition of the period of evaluation. It should be a board decision based on any of the following ways: lifetime of the IT project, strategic planning period of the organization or a specially assigned time by the board.
- C. To revise the definition of the discount rate or the minimum attractive rate of return on investment, that will be applied to the calculation of the net present value of the IT project. This rate shall be determined by the board; but considering that must be greater than the minimum risk-free rates (rates for deposits with fixed time, for example).
- D. To check the identification of additional inflows due to that the project is finished. To check that the additional inflows will be generated by the increase of the contribution margin (sales value minus variable costs) and by the savings whose were generated by the project. To consider as savings not only costs that will be absent due to the improvement in a process, but also savings in penalties that would arise if the firm fails in the delivery of an order, or the margins that would be forgone by the nonconformity and the retirement of the customers of the firm.

- E. To review the identification of additional outflows for the project. To remember that additional outflows are given by the additional investments and by the additional expenses, whose were generated by the project.
- F. To check the calculation of net flow as the difference between the additional inflows (additional contribution margin and savings) and additional outflows.
- G. To review the calculation of the value generation of the project. For firms, the value generation is determined with the calculation of the net present value of the net flows during the indicated period of time, applying the discount rate or the minimum attractive rate of return.
- H. To check whether the project generated or didn't generate value. If the project has a negative net present value or a positive net present value which is not attractive (a few dollars for example), it makes no sense to run the project.

### **3.5 Defining MEVGIT**

Based on the proposal of Alfaro (2015), the concepts which are associated to the calculation of the financial value of the innovative project (Table 10: FR-MIM3-010-001 Financial Evaluation of the Project), are the following: “additional inflows (additional contribution margins and savings), additional outflows (additional investments and additional expenses), the evaluation period and the discount rate (minimum attractive return rate) which was determined by the Finance Area of the organization.” (p. 27).

The additional inflows could be additional contribution margin and savings. The additional contribution margin could come through the sales or the reduction of the variable costs. The increase of the contribution margin through the sales could come in three manners: (a) the increase of sales to the current clients through the increase of the loyalty of clients after the improvement of the quality of the goods or services or the improvement of the delivery time, (b) the increase of sales to new clients, and (c) to avoid the loss of sales due to the improvement of the processes or the business model as a whole.

The additional outflows could be additional investments or additional expenses. The additional investments could include: (a) hardware acquisition, (b) software acquisition, (c) installation, (d) infrastructure, and (e) furniture and equipment. Also, it is important to consider that if the previous items are hired as services and not acquired, the inclusion of these items must be into the additional expenses. The additional expenses could include: (a) personnel, (b) advertising, (c) training, (d) support, (e) maintenance, (f) inactivated time, and (g) space and energy. Also, it is important to consider the accounting norms due to that when the personnel will work directly to the elaboration of the product or result of the project, the cost of the personnel must be considered as part of the cost of this product or result, and in the cases in whose the products are long term goods, the cost of the personnel must be considered as part of the investment and not as expense. Also, depending of the project, the hardware acquisition can include:

A. Hardware acquisition:

- a. Computing equipment: computing equipment for the main data center, computing equipment for the alternate data center, equipment for the servers, computing equipment for final users (desktops, laptops, all in one computers, etc.).
- b. Storage equipment.
- c. Printing equipment: network printers and user printers.
- d. Network equipment: routers, firewalls, switches, access points, network wiring, etc.
- e. Communications equipment: mobile phones, tablets, personal digital assistants, portable data terminals, etc.

B. Software acquisition:

- a. Base software: operating systems for servers, operating systems for final users, proxy servers, mail servers, database management systems, web servers, internet explorers, programming languages, programming tools, CASE (Computer Aided Software Engineering) tools, office software, project management software, etc.
- b. Information systems: Transaction Processing Systems, Customer Integrated Systems, Management Information Systems, Workgroup Support Systems, Decision Support Systems and Artificial Intelligence, Executive Information Systems, Interorganizational Systems, and Planning Systems.

C. Installation

- a. Installation of all the related equipment, hardware and software.
- b. Desinstallation of all the related equipment, hardware and software

D. Infrastructure

- a. Cold equipment for the whole data center.
- b. Racks with cooling system.
- c. Equipment against fire.
- d. Electrical equipment: board power with thermo-magnetic switches, voltage stabilizers and unterminated power supply equipment.
- e. Electrical wiring, if these items are applicable.
- f. Technical floor.
- g. Technical ceiling.

E. Furniture and Equipment

- a. Desks
- b. Shelves
- c. Related equipment

Considering these concepts, the steps of MEVGIT (Methodology for Evaluating the Value Generation of Information Technology) are the following:

A. To calculate the additional inflow whose will be collected by the product or result of the project.

- a. To calculate the additional contribution margin (in the case of firms) or the additional gross domestic product (in the case of nonprofit governmental entities) due to the product or result of the project

For firms:

- i. To calculate the additional contribution margin due to the increase of sales to the current clients.
- ii. To calculate the additional contribution margin due to the increase of sales to new clients.
- iii. To calculate the additional contribution margin due to the organization would avoid the loss of sales.
- iv. To calculate the additional contribution margin due to the reduction of the variable cost of sales.

For nonprofit governmental organizations:

- i. To analyze how to convert the nonfinancial benefits with the goods or services of the nonprofit governmental entities, to amounts of gross domestic product.
- ii. To calculate the amount of gross domestic product which will be increased through the product or result of the project.

- b. To calculate the savings due to the product or result of the project

- i. To calculate the savings due to the reduction of investments.
- ii. To calculate the savings due to the reduction of expenses.

B. To calculate the additional outflows whose will be collected by the product or result of the project.

- a. To calculate the additional investments

- i. Hardware acquisition
- ii. Software acquisition
- iii. Installation
- iv. Infrastructure
- v. Furniture and equipment
- vi. Others

- b. To calculate the additional expenses

- i. Personnel
- ii. Advertising
- iii. Training
- iv. Support
- v. Maintenance

- vi. Inactivated time
  - vii. Space and energy
  - viii. Others
- C. To calculate the net flow. The calculation of the net flow is the difference of the additional inflows and the additional outflows.
- D. To estimate the discount rate. The discount rate must consider the following criteria: (a) to be higher than the risk free rate, (b) to be higher than the average return on investment of the firms of the economic sector of the country or region, (c) to be higher than weighted average cost of capital, and (d) to be equal or greater than a minimum discount rate that the board of directors determined.
- E. To calculate the net present value. For calculating the net present value, the discount rate and the net flow must be considered. Each one of the net flow at the end of each period must be discounted dividing  $(1 + \text{discount rate})^i$ , where “i” is each one of the periods. The sum of the discounted net flows of each period will be the net present value.

## **Conclusions**

The conclusions are the following:

- A. The majority of managers of the organizations don't understand clearly how the innovations on information technology generate value. Also, many managers don't understand how their organizations generate value.
- B. The evaluation of the value generation of the innovations on information technologies can be realized through MEVGIT, a formal methodology which includes a theoretical framework based on: free cash flow, direct costing, total cost of ownership, and the MAIGTI's Procedure 59 (Procedure for evaluating the value generation of IT Projects).
- C. In the case of profit organizations, the value generation can be measured with the generation of money, due to that this calculation is easier than the calculation of the satisfaction of the customers and the satisfaction of the workers.
- D. In the case of nonprofit organizations, the value generation can be measured with the generation of benefits (health benefits, educational benefits, income benefits, or the benefits according to the final purpose of the nonprofit organization) of the target population.
- E. It is urgent to learn how to evaluate the value generation of the information technologies for avoiding pitfalls related to that concern, in profit organizations and nonprofit organization.

## **Recommendations for future researches**

The recommendations for future researches are the following:

- A. To determine a baseline of the practices of evaluation of the value generation of the information technologies, not only determining the state of accomplishment with the



evaluation, but evaluating the causes and consequences of the accomplishment and the lack of accomplishment with the evaluation.

- B. To evaluate the value generation of the innovation of diverse types of information technologies, such as: hardware, base software, and information systems, in diverse economic sectors, considering the diverse characteristics of the organizations and the countries. For this purpose, a group of the most important operations and projects in the organizations must be considered, taking into account a period of evaluation of at least 10 years, considering to have a range among 3 and 5 years after the beginning in production of the information technologies.
- C. To analyze if a diverse groups of operations or projects that the organizations will decide for their beginning, will generate value to the organizations really, with a transversal study, which would consider the diverse characteristics of the organizations, operations, projects and economic sectors in diverse countries.
- D. To improve MEVGIT considering the results of similar researches as the mentioned previously.

## References

1. Alfaro, E.A. (2015). MIM3: Methodology of Innovation Management for obtaining the Level 3 of I2MM. *CENTRUM Católica's Working Paper Series*, DOI N° 2015-09-0013.
2. Alfaro, E.A. (2012). Identificación de Beneficios Financieros Concretos de la Implementación de Tecnologías de Información. *Lidera*, 7(7), 17-18.
3. Alfaro, E. A. (2011). *MAIGTI: Metodología para la Auditoría Integral de la Gestión de Tecnología de Información*. Lima: Universidad Privada Norbert Wiener.
4. Alfaro E. A. (2007). *Los ERPs ¿Generan o Destruyen Valor?* Trujillo, Peru: Universidad César Vallejo, V Congreso Internacional de Ingeniería de Sistemas.
5. Avraham Goldratt's Institute. (Producer). (1999). Goldratt's Satellite Program - Video 7: Managing People.
6. Bibo, L. (2014). Overtures to reducing Romanian Ministry of National Defense Tenuity in Information Resource Management. *Journal of Defense Resources Management*, 5(2), 89-98.
7. BMI Research (2015a). *Peru: Information Technology Report Q4 2015*. London, United Kingdom: Business Monitor International Ltd.
8. BMI Research (2015b). *Chile: Information Technology Report Q4 2015*. London, United Kingdom: Business Monitor International Ltd.
9. BMI Research (2015c). *Brazil: Information Technology Report Q4 2015*. London, United Kingdom: Business Monitor International Ltd.
10. BMI Research (2015d). *Argentina: Information Technology Report Q4 2015*. London, United Kingdom: Business Monitor International Ltd.
11. BMI Research (2015e). *Venezuela: Information Technology Report Q4 2015*. London, United Kingdom: Business Monitor International Ltd.
12. BMI Research (2015f). *Colombia: Information Technology Report Q4 2015*. London, United Kingdom: Business Monitor International Ltd.
13. Chih-Chang, C. (2013). The Free Cash Flow Rate on the Stock Return Rate. *Journal of Accounting, Finance & Management Strategy*, 8(1), 1-22.
14. Goldratt, E. M. & Cox, J. (1984). *The Goal: A Process of Ongoing Improvement*. MA, USA: North River Press.

15. Goldratt, E. M. & Ptak, C. A. (1999). *Necessary But Not Sufficient: A Theory Of Constraints Business Novel*. MA, USA: North River Press.
16. Iotti, M. & Bonazzi, G. (2014). *The application of life cycle cost (LCC) approach to quality food production: a comparative analysis in the Parma PDO Ham Sector*. American Journal of Applied Sciences, 11(9), 1492-1506.
17. Klychova, G. S., Zakirova, A. R., Zakirov, Z. R., & Valieva, G. R. (2015). Management Aspects of Production Cost Accounting in Horse Breeding. *Asian Social Science*, 11(11), 308-312.
18. Kousenidis, D. V. (2006). A free cash flow version of the cash flow statement: a note. *Managerial Finance*, 32(8), 645-663.
19. Laudon K. C. & Laudon J. P. (2012). *Management Information Systems: Managing the Digital Firm* (12<sup>th</sup> ed.). New Jersey, USA: Pearson Education.
20. Noreen, E., Smith, D., & Mackey, J. T. (1995). *The Theory of Constraints and its implications for Management Accounting*. USA: The North River Press.
21. ONGEI (2015). Avances y Retos del Gobierno Electrónico en Perú. Retrieved at November 27<sup>th</sup>, 2015 from <http://www.solucionespracticas.org.pe/Avances-y-Retos-del-Gobierno-Electronico-en-Peru>
22. Soluciones Prácticas (2015a). TIC para servicios públicos rurales. Retrieved at November 27<sup>th</sup>, 2015 from <http://www.solucionespracticas.org.pe/tic-para-servicios-publicos-rurales>
23. Sosa, P. M. & Alfaro, E. A. (2011). Financial evaluation of the value generated by an information system in a transport firm. *Ingeniare, Revista Chilena de Ingeniería*, 19(3), 442-456.