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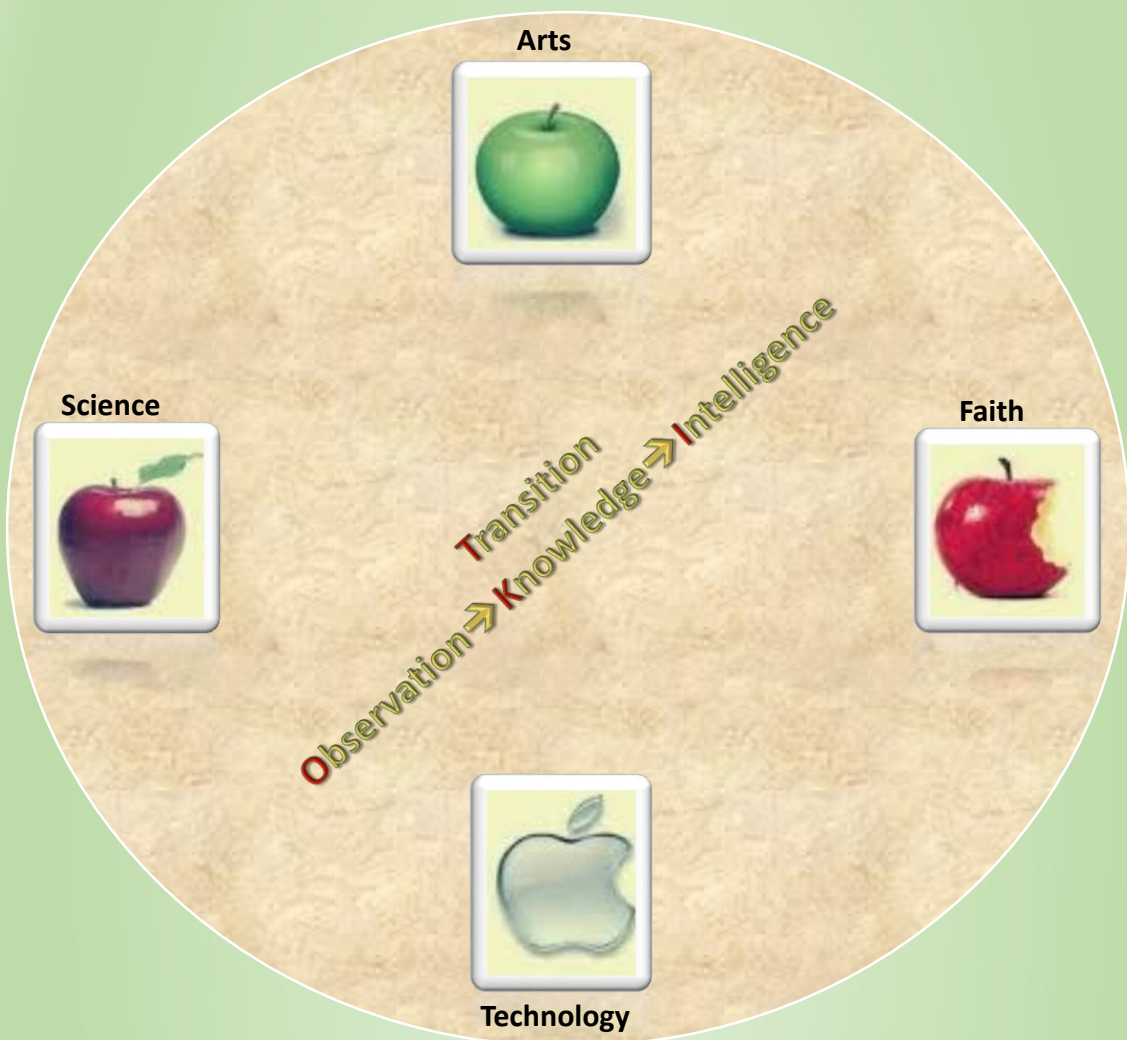
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New governance and support tool for decision: challenges for effective adoption

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Abstract The target of any support tool in a decision process is to enlighten the decision-maker to take a quick and safe position or at least minimize the degree of uncertainty in decision process. It provides transparency in processing and accuracy in decision making that is based on reliable and neutral information (free of constraint). But the decision is almost always influenced by external factors such as political, cultural and social pressures as the adoption of these tools are sometimes problematic and receive a mixed reception. On one hand, there are those who appreciate the clarity, traceability and availability of reliable information and on the other, those who see the tool as a private mechanism of accrued benefits. This article aims to present not only the difficulties in the implementation process in Cameroon to help decision tool that we developed for the education system but also to sketch some solutions that will facilitate its adoption and optimize its use.

Keywords: decision support tool, indicators, dashboard, business intelligence, governance, information.

1. Introduction

The Dynamics Observatory applied to the Educational System (DOES) is a tool to aid the decision that we have applied to the Cameroonian educational system. Such a dashboard, is composed of a set of indicators with extended features of control with the environmental elements studied. The monitoring and management tool, allows to observe, monitor and alert on the state of the education health system. This tool facilitates data interpretation through synthesizing information in the form of visual data. It becomes an observatory through which the decision-maker observes, analyzes and orients his decision based on the behavior of one or more indicators. All decision support tools aims to inform the decision-maker the decision-maker to take a quick and safe position or at least minimize the degree of uncertainty in decision process. It provides transparency in processing and accuracy in decision making that is based on reliable and neutral information (free of constraint). But the decision is almost always influenced by external factors such as political, cultural and social pressures as the adoption of these tools are sometimes problematic and receive a mixed reception and we believe that technological changes in our environment require a change in the practices of governance both in the production and dissemination of information in decision-making. We believe that questioning no longer resides on the beneficial contribution of tools in organizations but in the effective range of their adoption in decision making. Our work is organized around four main points: the first presents the environment in which our project is carried out. The second is a presentation of dynamic observatory of the educational system which is our decision support. The third point will present the information practices within the educational system and the last point will explain the reasons why we believe that there is a need to change the approach for a more efficient adoption of the tool for an improved governance.

2. Study background: Cameroon in 2035

"Cameroon: an emerging country, democratic and united in its diversity", that is the vision of Cameroon by 2035 (BAD, 2009).

Arising from retrospective and prospective studies on the needs and aspirations of the people, this is the leitmotif of the economic and social policy of the Executive of Cameroon. The overall objective of Cameroon includes a set of intermediate objectives: (i) the reduction of poverty; (ii) reaching the stage of middle-income countries, (iii) reaching the stage of newly industrialized country and (iv) the consolidation of the democratic process and national unity while respecting the diversity that characterizes countries (cf MINEPAT, 2009). Adopted in 2009 adopted the Strategy Document for Growth and Employment (SDGE) reflects the desire of the Government opts for the search for inclusive and inclusive growth involving "of fostering a high-employment economy delivering social cohesion and territorial "(Hakimian, 2013). The SDGE is therefore the economy navigation compass for achieving the vision for the period from 2010 to 2020. Reference Document, it aims to accelerate growth with the creation of formal jobs and sustained reduction subsequent poverty. However, it is found that one stays long or not in the school system, the result is the same on the job market, access to which is not easy. Conscious of this situation, the President of the Republic affirmed during one of his talks: "We must find solutions to the latter problem for especially young people, graduates or not, who arrive each year in large numbers on the job market. "(Biya, 2006). In effect, considered as "the nation's spearhead," Youths are a call for concern and their education is of utmost priority.

To realize its vision, the country is transformed into a huge construction site Beginning with structural projects and increasing the Workforce productivity will depend on the quality of education. It is therefore right that the guidelines of the SDGE lay the foundations of the main points on which can rest a successful education system can rely (CEC, 2012). The following objectives are assigned to departments in charge of education, some of which are:

i.   a sound basic education that acquires a set of basic knowledge, including those that involve reading, writing and counting, and general skills to easily adapt to the changing labor market;

ii.   quality technical and vocational education enabling the acquisition of skills needed in the labour market;

iii.   a balanced system of higher education that offers programs at various levels (including post-secondary training programs for short duration), which is closely linked to the needs of the labor market, and which facilitates the adoption of the new research and technology outcomes.

The SDGE notes that the issue on human capital formation will consist on one hand to give the population a good health state, education, knowledge and professional competences; and secondly to facilitate its insertion into the labor market as demonstrated by several authors, education is the foundation for the emergence of a country and its impact on the emergence is both direct and indirect. Direct by improving work quality and the mastery of technological innovation; and indirect in view of the benefits of the economic growth (social progress, cultural and human changes) (cf Mincer, 1974 Psacharopoulos, 2004 and Poirot, 2005). With this in mind, the performance research on the education system is indispensable for Cameroon.

With a diagnosis of the education system established, action must be taken to achieve the objectives. However, as pointed out (Ndjock, 2014), if majority seem to be put on the identification of problems, it is far from being the case with the actions to be taken. Recognizing that the system suffers from inefficiency is not enough, for example, not putting the stakeholders on an appropriate indicator and the means to attain the objective. David (2008) David, 2008; confirms that: "A problem shared does not necessarily mean shared understanding of the problem." Defined as decisional problem, "the performance of an education system" requires the specification of indicators for its evaluation. However, the education system is proving to be a complex system where many entities are interacting, the necessity of collaboration between the actors and the establishment a support decision tool seems undeniable; hence the choice of the development of the Observatory dynamics of the educational system. Dynamic both in design and in its operation.

The inclusion of key stakeholders and partners takes account not only of their respective contexts but their regulation and their sources of information. The definition of an indicator requires an agreement with all stakeholders on its performance and use. Instrument tasked to collect data on the implementation of the strategy to improve the quality of education, analyze, compare them with the guidelines and store them to serve as database accessible to decision makers to take an effective decision; The observatory consists of a set of indicators. As a dashboard, these indicators will gauge to inform the health aspect of the education system. In case of significant differences that might jeopardize the achievement of objectives, triggered alarms will endeavour to remedy and correct as soon as possible by offering corrective actions.

3. Dynamic observatory applied to the educational system

Description

Decision making is defined as "... a complex cognitive process of selecting a type of action among alternatives. "As part of the decision-making process is the information available that guides the process and choice for solving the decision problem. For this reason, the decision maker must have the relevant information or, several factors influence the decision making such as the political, cultural and social. These factors are crucial in the application and processing of information and play an essential role in the decision making. The diversity of actors involved and the complexity of the education system make it particularly difficult, determination of indicators, collection and processing of information, however, it is necessary that in such an environment, the information is free of coercion to help make the right decisions. To assist the various heads of departments to provide relevant information and neutral of any constraint, we conceptualized the Dynamics Observatory applied to the Education System (DOES).

Observatory device of the territory to track changes over time and space, the observatory is considered a tool of knowledge and evaluation and especially a permanent tool to aid the decision. Some authors like Brown et al. (2005) define it as an observation device or dedicated to a

theme, and implemented by one or more organizations to describe and learn about the evolution of a phenomenon, a field or a portion of territory in time and in space. Its operation and its implementation are available in several stages: unite all the actors concerned by the problem, an inventory of available data, collect and recycle these data and disseminate results (Brown et al., 2005). This tool as a "cockpit" serve as a "dashboard" with extended functionality to control certain elements of the environment studied. The monitoring and management tool, will observe, monitor and alert the health aspect of the education system. This tool will facilitate the interpretation of data through synthesizing information in the form of visual data as presented in Figures 1-3. It becomes an observatory through which the decision-maker observes, analyzes and orients its decision based on the behavior of one or more indicators. The indicators are presented in a dashboard which according to Fernandez (2008), is a performance measuring instrument facilitating the proactive control of one or more activities. The dashboard is a decision support tool that is intended to guide the actions and ensure proper management of a program of work. It consists of a set of indicators which from diagnosis to interpretation of the results, should allow describing the state of the system and analyzing the actions based on the objectives while taking into account the socio-economic aspects (Maurizi & Verrel, 2002).
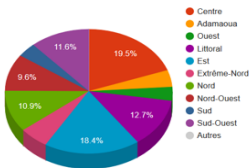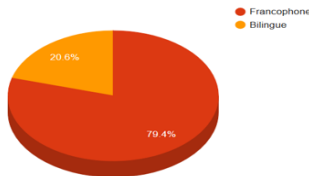

Figure 1 : Distribution of teachers by region

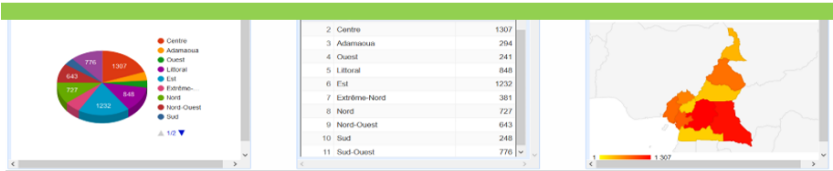*Figure 2: Distribution of teachers by subsystem*

Figure 3 : Distribution of learners by region

The value of an indicator can be based on a single data (Figure 4) or result from a calculation involving several data. This is the case of enrollment, management or computers learner ratios. This is the case of main ratios: learner/computer, learner/teacher. Calculation is the number of students enrolled divided by the number of teachers or the number of computer in school.

Total : 148 teachers

Name and first name	Matricule	Date of birth	Age
	352636 F	1955-04-21	61 ans
	127381-M	1955-09-07	61 ans
	082283-M	1955-10-14	61 ans
	143798 K	1955-05-18	61 ans
	116934 A	1955-09-14	61 ans

Figure 1 : Teachers who have reached the retirement age but still work in the central region

These data are technically accessible and are available in a database such as the National Institute of Statistics, the Ministry archives, statistical institutions, the World Bank and the Strategy Document for growth and employment. As the data is valid for a certain period in time, their relevance must be considered in the case of numbers of learners and teachers, the number of computers, results in official examinations, equipment and other amenities.

The characteristics of the indicators can be described on the roadmap of the SDGE and on the displayed interface, users can view the said indicator but not edit. This display to provides information on the definition of the indicator, its possible representations, on considerations related to the use and interpretation, its validation mechanisms, etc. Representative information both quantitative and qualitative indicators are presented precisely to allow the user to focus on the value as well as its meaning in a global perspective as advocated by Kaplan & Norton (1992, 2003) the system provides a set of indicators that users can adapt to their environments as needed or can be shared within the same community of users.

Decision support tool

In the current context, the ability of decision making, speed and relevance of decisions is a major challenge: This is to make choices, managing a significant level of uncertainty. The decision aid is part of the decision process to bring out what is objective from that which is less; to dispel some form of misunderstanding in communication. The authors (Roy & Bouyssou 1993) define it as "an activity of one who, building on models, helps to get answers to questions asked by a player in a decision process, components used to clarify the decision and recommend a behavior likely to increase the coherence between the evolution of the process and the objectives of this stakeholder "as the observatory will be the instrument of information, reflection and aid decision making because a good decision necessarily requires good information, and collecting it is not easy in a hyper dynamic world. It will produce and share information and knowledge for decision making and monitoring of the various sectors of an economic, social and cultural (cf Kreit, 2007.) DOES works to promote access to information as well as statistical data to policymakers, stakeholders, public authorities and partners in the education system:

- For policy makers: a management and governance support to enable them to develop appropriate strategies for the achievement of objectives;
- For educational institutions and partners: a tool to improve and refine their industry knowledge, essential lever continuity of courses
- For governments: a governance support for the implementation of public policies in line with ground realities

The effectiveness of the monitoring depends on the organization of information communication within the structure as recalled by Carlo Revelli (2008) "Without craft competence capable of proritizing and interpreting the data, a business intelligence application is doomed to failure. "And the analysis of user's information practices is important for understanding its information literacy. It must be understood by "information practices" here in a broader sense, as described by

Chaudiron and Ihadjadene (2010) which refers to how a set of devices, from formal sources or not, Tool, cognitive skills are effectively mobilized by an individual or group of individuals in different situations of production, research, organization, processing, use, sharing and communication of information. The term "practice" includes both behaviors, representations informational attitudes of the user (Ihadjadene and Chaudiron, 2008). In this sense, the authors point out that this concept incorporates without exceeding the traditional definition to the concept of "information practice". In the context of the search for information by authors such as (McKenzie, 2003) has developed a model of information practices to realize the search for information in everyday life or Sanna Talja and Preben Hansen who define it as the "practices of information seeking, retrieval, filtering and synthesis" (Talja and Hansen, 2005). Similarly, Liquete (2005) points out that the representation of the information system is closely linked to that personal needs for information provided that the information system is a set of physical, human, methodological resources and operations information processing in the service of all stakeholders of a structure for decision support, collaborating in updating knowledge, or simply taking information (Fondin H., 1996). It therefore takes a much larger dimension than just system documentation especially because it manages information of various kinds. DOES allows the decision maker to orient decision in accordance with the actual context/situation based on the stated objectives through the intersection of statistics and the reading of the indicator's behaviour. For example, the transfer of teachers in rural areas and at the same time, the decongestion of urban areas already saturated. Retirement of staff who have reached the age limit. The reorganization of the data transmission circuit (statistics) to the hierarchy. The following section will shed further light on the decisions taken or to be taken and the obstacles ahead for a better integration of the tool.

4. **Challenges for Good Governance**

Observations from integrated data to date in the system reveal flaws that distort the calculation and assessment of indicators and can point

to inadequate decisions. For illustration, we present a few that are relevant to the above screenshots.

Figure 2 shows the teacher distribution between two subsystems: Francophone subsystem and the "bilingual" subsystem. In Cameroon, these subsystems coexist and evolve independently in its assessments and certification methods (Act 1998). However, in this figure, even if there are two sub-systems, they are not representative of the environment. The "bilingual" subsystem is in fact the combination of some institutions that harbour within them the English and French systems.

Figure 4 shows the list of teachers in the center region who are still in active service but have reached the retirement age. The center region is where the political capital -Yaounde- is found. Retirement age varies from one ministry to another. As regards ministerial departments; 60 years old for the basic and secondary education and 65 years old for the higher education.

Name and first name	Matricule
	Total : 57 teachers
	553568-M
	501 927-Q
	103 635-U
	592638-Y
	714072-I

Figure 2 : Figure 5: Teachers between 60 and 70 years old in the Mfoundi Division

Figure 5 Points out that Majority of the teachers having attained the retirement age and still under service, are found mainly in the Mfoundi Division situated at the heart of the capital. This is explained by the fact that in the central region and the Mfoundi Division, the saturation of teachers is alarming.

Figure 6 shows teachers who spent at least 10 years in their current structure. The texts stipulate that after 3 years minimum and maximum

5 years, a teacher may be transferred to another institution. This allows a better rotation and increases efficiency because without recycling, a teacher may become less performant and consequently performance

Name and first name	Matricule	Date of birth	Number of year	School
	598936 G	1969-07-08	16 ans	Lycée de Kokodo
	561122 J	1963-01-15	16 ans	Lycée Ebebda
	673385 K	1977-07-04	16 ans	Administration
	655163 I	1978-04-18	16 ans	Lycée Elig-Mfomo

Total : 690 teachers

decreases.

Figure 3 : Teachers with at least 10 years of service in current position

All these figures reveal a problem of communication and a poor mechanism put in place. Normally, each year, school leaders have a duty to send statistics through official channels to allow date update but from the comments, either it is the school leaders who "forget" or, the statistics do not reach their destination. Thus, the hierarchy does not have up-to-date statistics and decisions are thus unsuitable for the reality of the environment. The communication failure cache and maintains a much more insidious evil that is corruption. Indeed, if real statistics were to reach the top and that cleaning was done, some personal benefits would be cut off; such as perceiving a government salary when supposed to be retired, to be found in the hinterland that is estimated to be for "other" and prefer not to fill their scheduled quota in the capital. The institutions ranked among the best in relation to their percentage of success in official examinations are those that limit the number of internal candidates based on internal results. The other candidates though regularly enrolled, but whose chances of success in the exam are below 50% are presented as external candidates. If the inspectors do not "turn a blind eye" about this practice, the statistics would be more realistic and indicators would reflect the environment. By adopting the DOES; subtraction, retention and falsification of information would not be possible.

A survey carried out on users of the DOES at the ministerial department of secondary education shows that 80% of the users would like to adopt the decision support tool. A question is thus asked to know they would like to adopt the DOES, the first function (84.3%) is the sending and receiving of statistics at the source and curiously, this is the same why some fear its adoption because, there is no way for falsification. The duties of those who will willingly adopt the tool are in descending order are the directors of the central government, 60%; principals, 20% directors of decentralized services, 10%, department heads and bureau chiefs, 10 %. Another problem raised by the DOES is the fact that 40% of the users are concerned that they would no longer have a say after the adoption of this tool. They think that the tool is conceived to take decisions for them. 50% are reluctant to adopt for fear of innovation. The leap into the unknown scares and they are few who dare to take the plunge.

The flow of information and forms of communication are usually linked to the organizational structure of the structure. Thus, in a very hierarchical structure, formal communication will be the most developed. Formal communication is a communication provided in the organization, which is compulsory (e.g. staff meetings, boards of directors, memos, meeting, etc.) (Duterme, 2002). The flow of information is generally hierarchical and downwards, where information spreads from the superior to his subordinates and exceptionally upwards, provided it is in writing and formalized. The administration of the Cameroonian education system can be considered central in the sense that centralization is an organization relying on the officer placed at the top of the structure. This officer takes all the decisions and all information must go up to him to help make the optimal decision. In our case study, it is the head of the ministerial department who takes all decisions concerning his organization. The information starts from the top down and back through official channels. However, given the increasing complexity of the environment, the increase in population, the increase in the schools and the need for rapid decision-making, this centralized organization has become inefficient by its non-mastery of its environment because

communication networks do not always respect the established chart. Indeed, informal communications have taken precedence over the formal. Spontaneously, they work better. For example, information about a possible appointment or deployment of a colleague, an opening, closing or transformation of a school can circulate very quickly in parallel networks and lead to serious consequences for the mobilization and involvement of actors. These informal networks of information flow are formed depending on the status of the staff (directors of the central administration, heads of decentralized departments, school principals, teachers etc.), these interpersonal relationships generally allow a rapid increase in the flow of information. That is why this component is not to be overlooked in the design of a decision support tool because it plays an important role in internal communications and allows flexibility in the flow of information.

Some authors believe that information is the pivot of the organizational system of the company. It is a message or data perceived by a recipient, amending his knowledge on a topic or allowing it to solve a problem. (Fondin H., 2001) For many years, the managers thought that keeping information was a source of power. Today, the flow of information has become an internal communication strategy. Indeed, they believe that when it circulates well, it fosters communication and becomes a factor of cohesion, motivation, effective decision making and creativity. Identifying the company's information systems is therefore a force for the employee. This allows him to be well positioned and receive useful information at the right time. If it is proven that possessing useful information is essential for an employee, it therefore becomes, important for the manager to give out information and use his knowledge in developing internal communication. (Mucchielli 2000).

With the advent of Information and Communication Technologies (ICT) and its devices, traditional modes of information flow are changed. Indeed, they bring new forms of circulation of information, easier information sharing, more rapid dissemination of information, virtually instantaneous communication. They also help develop, through cooperative work, sharing skills and team spirit (Grimand

2000). For example, sending invitations and notices by email instead of printing them or using the postal services. This does not mean that we should eliminate the traditional tools of information flow (notes, letters, newspapers ...) but we find that the model can be seen as with real-time communications, information flows much faster and more reliably.

Agostinelli (1999) already presented some benefits of ICT devices in the collection, processing, storage and circulation of information:

- More flexible access to information (the tool used to transmit and receive information to all employees, regardless of the day and time)
- Group work is facilitated (the tool can serve as a collaborative platform)
- Establish a memory and collective statistics.

The new tools have not yet taken the place of the traditional tools of information flow but are sometimes juxtaposed. Indeed, it is still very common to receive an information note on paper and receive e-mail in his box in electronic form. Sometimes they helped to bring greater visibility to a document or customize the information based on the target to which they are transmitted in the company, however, note that the introduction of new tools implies the deregulation of services. Today, the information sharing is needed, staff and employees can easily access the information at any time, but must also meet the demands of the informative flows that seek to regulate the operation of the education system. They will have to adapt to an effective information system, able to mobilize around objectives. This requires the interconnection of system stakeholders to coordinate their actions taking into account the specificities of each. Tools like the DOES put all company stakeholders in a position to communicate. Information becomes accessible to all in due time. The multifunctional communication also demands greater availability and responsiveness of employees. For example, with the popularization of mobile phones, one can see the SMS (Short Message Service) entering the communication modes of the department, it allows information to arrive quickly to the employee. These tools are transforming not only the formal communication but also informal communication. ICT must become

the universal communication tool, allowing direct exchanges between personnel. Indeed, while a director is at consultation meeting, he may request through his mobile phone the name of a manager of a specific institution or staff. The collaborator answers his question and the manager receives the information on his mobile. Still rare today, however this service enables the development of social networks in organizations, promotes the flow of real-time information and participates in information monitoring and informal communication structures (Fairon, and Klein, 2006).

The information, whether formal or informal, down or cross, will circulate much faster with modern technological tools. If ICT tools promote the favourable exchange of information, however, it should control the flow of this information to also verify the nature of the information exchanged, in some cases, which can serve the organization (Yijue and Min-Yen, 2005).

There are privacy issues to manage. All information collected on the outside cannot be exploited in shared mode. Sometimes, some requests made by the team members may inform the user community on the nature of a confidential project Benghozi (2001) and Rallet (2006)

5. Conclusion

Technical developments in our environment require a change in the governance practices both in the production and dissemination of information in decision making. We believe that questioning no longer resides on the beneficial role of ICT in organizations but on the effective range of their adoption in decision making. There is little time, the lack of tool could explain the indifference vis-à-vis decision makers in the use of tools for decision but nowadays we suppose that doubled indifference reluctance would explain the lack of motivation and fear of innovation. The leap requires a modification of the work environment and requires rethinking the space and time in the process of decision making. However, use of tools for decision-making purposes does not mean that computer tools replace the decision maker. All observations and research on this show instead that the Information Technology and Communication (ICT) never supplants the decision

maker. They are actually their place in the process because they bring added value to the act of deciding; because they enable, among others, to better visualize the phenomena, structures in space, changes of state; better test hypotheses, possible solutions. No automated system despite the efforts and technology can replace humans in decision making; it can only be limited to the guidance by providing reliable and relevant information. The goal of any tool to aid the decision is to enlighten the decision-maker in the decision to be taken quickly and safely position or at least minimizing the degree of uncertainty in decision making.

Aside from its logistics function (organize the flow of information), internal communication has other roles within an organization, computerized information systems can also help to preserve the capital of knowledge and skills, to convey the image of the organization and strengthen the sense of belonging (even to the most remote personnel within the country and can therefore easily communicate with its employees). For in this notion is also found that of the social process (Levy, 1997) where the relevance of the use prevails on the technicality of the tool. The quality of the processes of appropriation of technology by the recipient remains predominant on the specificity of the tool, technique and its implementation can hardly be considered separately.

These decisions support tools allow the capitalization of knowledge in fixing the intangible knowledge of the ministry, for example (knowledge management), encouraging emulation. They also allow the development of shared and therefore timing, instant verification of deadline mailing files and organization of internal reviews among others.

A research carried out is to enrich and renew the information models in the light of these contributions. This would be for us to offer an info-communicational approach of access and information dissemination devices. Finally, we believe that line of thought is to consider other considerations, previously neglected but now intervene in problems of decision support tools: the question of the confidentiality of information, the relevance and the effectiveness of the resulting decisions.

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Transition from Observation to Knowledge to Intelligence (**TOKI**) Conference is a forum that allows researchers from the fields of Competitive Intelligence, Internet of Things (**IoT**), Cloud Computing, Big Data and Territorial Intelligence to present their novel research findings and results. Common to all these fields are the concepts of information, information systems, knowledge, intelligence, decision-support systems, ubiquities, etc. The relevance of research findings, results obtained, systems developed and techniques adopted in these research fields for both the industries and government cannot be overemphasized.

Therefore, the Conference welcomes contributions in the following areas:

- Smart Cities: With focus on Intelligent Transportation Systems, Observatory Systems, Smart Electricity Grids, building automation, assisted living and e-health management systems. Areas such as application of Geographical Information Systems, Territorial Intelligence and Sensors are also considered.
- Big Data Analytics: This includes Big Data, Information Visualization, Data Analysis and related applications.
- Semantic Web: Standardized formats and exchange protocols for web based data.
- IoT Analytics: These center around innovative algorithms and data analysis techniques for extracting meaning and value from the Internet of Things.
- Resource Management: This includes energy saving techniques, effective and efficient utilization of resources, intelligent data processing, mining, fusion, storage, and management, context awareness and ambient intelligence.
- IoT Enabling Technologies: These center around technologies that drive pervasive / ubiquitous systems some of which include but not limited to IPv6, NFC, RFID and Microprocessors.
- Interoperable and Adaptive Information Systems: These include but are not limited to Decision Support Systems, collaborative and co-operative systems and other forms of systems that support interfacing of multiple elements and entities.
- Mobile IoT: Smart phone applications for generating and consuming data, crowd sourced data, e-commerce, mobile advertising, B2B, B2C and C2C connectedness.

Cloud Computing: Including security, storage and access to data stored in the cloud; service provisioning and resource utilization; cloud communication protocols; interoperability among users and devices with respect to linked data.

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