



ANALYSIS OF MANAGERIAL INNOVATION FLOW ON THE SMALL AND MEDIUM IT SIZED ENTERPRISES

ABSTRACT

The purpose of this paper is to develop a diagram flow of strategic decisions of small and medium-sized high-tech enterprises and explains how it can be used to transform an innovate idea into a competitive output to the market. The basis of the proposed model is in co-creating experiences that involve the consumer, it has five steps: 1- Idea generation; 2- Planning; 3- Processing; 4- Output; 5- Market and with thirteen Phases. These enterprises are characterized, by their ability to create value, high skilled workers and use technology in their internal processes. These firms face some problems like weak strategies of IT management and limited human and financial resources. The approach suggested in this paper offers to small and medium-sized IT firms an opportunity to innovate or create newer outputs and increase their competitive. The literature review shows the concepts of the management of technology and innovation. The proposed model for the management of innovation needs active participation of the IT manager and employees. This allows the organization to control the quality of the innovative product/service. The methodological background of this paper is characterized as exploratory and it consisted of data surveying on the international literature available. Additionally, this paper can be used as a guide to building innovation as strategic competitiveness on the small and medium IT sized enterprises, denoted SMET at this paper.

PALAVRAS-CHAVES: Innovation; Small and Medium Enterprises; Technology Management; Strategies.

ANÁLISE DO FLUXO DE INOVAÇÃO GERENCIAL NAS PEQUENAS E MÉDIAS EMPRESAS DE TECNOLOGIA DA INFORMAÇÃO

RESUMO

O objetivo deste trabalho é desenvolver um diagrama de fluxo de decisões estratégicas das pequenas e médias empresas de alta tecnologia, e explica como ele pode ser usado para transformar uma ideia inovadora em um produto competitivo para o mercado. A base do modelo proposto é composta por cinco etapas: 1- Geração da ideia; 2- Planejamento; 3- Transformação; 4- Output; 5- Mercado com treze fases. Estas empresas são caracterizadas, por sua capacidade de criar valor, empregam trabalhadores altamente qualificados e utilizam alta tecnologia em seus processos internos. Estas empresas enfrentam alguns problemas como estratégias fracas de TI, limitação de contratação de mais funcionários, e gestão financeira limitada. A abordagem sugerida neste trabalho oferece às pequenas e médias empresas de TI uma oportunidade para inovar ou criar produtos e aumentar sua competitiva. A revisão da literatura mostra os conceitos de gestão de tecnologia e inovação. O modelo proposto para a gestão da inovação precisa da participação ativa do gestor de TI e funcionários. Isso permite que a organização possa controlar a qualidade do produto/serviço inovador. O fundo metodológico deste trabalho caracteriza-se como exploratória e consiste de levantamento de dados da literatura internacional disponível. Além disso, este artigo pode ser utilizado como um guia para a construção de inovação como competitividade estratégica das pequenas e médias empresas de TI, denotado pela sigla PMET neste trabalho.

KEYWORDS: Inovação, Pequenas e Médias Empresas, Gestão de Tecnologia; Estratégias.

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INTRODUCTION

Companies aim to transform innovation into organizational actions. According to Schumpeter (1989), innovation is a creative development of methods and production or work organization, which opens up new market niches.

The process of innovating begins by analyzing new opportunities. However, each economic activity displays specific dynamics to small and medium IT sized enterprises (SMET), related to the size and innovative capacity of each company. Small and medium-sized IT firms addresses with electronic, robotics and telecommunication into the high technology sector in Brazil (OLAVE e AMATO NETO, 2001). These firms are characterized by their ability to create value, employ highly skilled workers, and use technology in their internal processes. Also, they have ability to create value (NETTO VALÉRIO, 2006), are flexible (HUDSON & SMITH, 2007), have greater volume of data and information to making decision.

The use of information technology can benefit companies, but they must have an appropriate organizational culture, high commitment management of chief executives and strong motivation of the employees (CHOI & LEE, 2003; CROSS & BAIRD, 2000). In order to assess and optimize the internal efforts of people, information technology promotes adequate synergy to develop new projects, which one can be the services or the products of small and medium-sized high-tech companies.

In Brazil, employment levels and production of SMET are being increased, as described by Olave e Amato Neto (2001). The information services represent 27,9% (USD \$ 88.3 billion) of net operating revenue of the service sector in 2007 (IBGE-PINTEC, 2007). That same year, the activity of computing comprised 58.627 enterprises, which generated USD \$ 20.97 billion of net operating revenue. Among the sectors with have highest rates of innovation, the sector of software consulting highlight with the rate of 77,9%.

This research needs to explain the workflow management of SMET innovation process. According to Azevedo Júnior e Campos (2008), there is a lack on the academic methodologies to understand and align the requirements of an innovative product to the real needs of the demand. As a result, this research is driven to better comprehend this phenomenon, it can help managers to be aware of the concept of strategic management and how it can be used to sustain competitive advantage to SMET.

LITERATURE REVIEW

Analyses of Innovation on Information Technology enterprises

The intensity of use and the type of IT depend on the degree of changes in the market sector and in the branch of activity of organizations (MASSA and TESTA, 2000), it is shaped on

account of the interactions and the availability of management tools for business success (O'REGAN and SIMS, 2008).

The dynamism of the market stimulates companies to invest in innovation, especially when the competitive intelligence is focused on developing new products or services (DOU and DOU JR, 1999). In addition to this, companies realize their investments in research and development (R & D) according to financial returns expected and with the potential to support the risk before the implementation of innovation. This involves several factors that interact when seeking greater profitability and assimilating clients' needs. McAdam (2000) describes the elements that encourage innovation in small and medium firms are: Flexible structure, greater availability of information flows; Entrepreneurial spirit of the leaders and employees; Exchange of knowledge from the informal learning methods and the relationship between employees; Reduction of taxes to encourage innovation; Niche market not covered thought large companies; Synergy between employees, suppliers and customers.

However the factors mentioned above, by itself only, does not drive the innovation. The solution found by the followers of the theory of Schumpeter (1989) is the facilitation of financial credit. In Brazil there is a mechanism of economic subsidies from the federal government level, the institutional called FINEP (Studies and Projects Finance), which guides the grants for projects of technological innovation in companies through public tenders. In 2008, were intended by this agency, USD \$ 245.05 million non-recoverable funds in 206 projects. Of this total, 14 are considered small firms and 11 medium enterprises, concentrated in the area of information technology and communication (IBGE, 2006).

Challenges of SMET

The incentives for SMET to boost development and innovation are historically short, and, according to the National Association for Research, Development and Engineering of Innovative Companies (ANPEI, 2007), around 47% of SMET companies do not know about these incentives for innovation. For SMET entrepreneurs, the small amount of capital available is one of the main factors to limit innovation, since there is the difficulty to waiting for the payback on the initial money invested. The impact of capital held is the impossibility to movement the money into other firm activities or in other business areas, consequently the necessity of the return of the investment in short space of time to sustainability innovation as a new product in the market.

The investment made in innovation must be recovered by marketing, there being no opportunity for innovation that has no financial return. In other words, for these entrepreneurs, if innovation does not generate value, it is not considered innovation; it is only a novelty that is irrelevant for business. This is equivalent to the fact that every innovative idea is equivalent to a risk (McADAM, 2000), and this should be calculated before developing the idea into a product.

SMET are contemporary organizations in which the specificity and the business focus of each firm dictates the market it works in and the needs for these companies to work not only with creative ideas but with the notion of the “investigation needs” of the demand (WALKER and BROWN, 2004). To do so, SMET needs mutual trust of their employees (WOOLGAR et al., 1998). These employees’ decisions will contribute to the growth and sustainability of the business in the market (FORSMAN, 2008). Because, more open and dynamic is the work environment, lower is the capacity to formalize knowledge networks and to stabilize norms and internal protocols and schedules.

Another point to observe is the paradox on SMET, Netto Valerio (2006) warning that in case of failure to make profits to reinvest in the business processes, SMET probably will not have enough capital to maintain a highly qualified team to carry out innovations. For these employees, only way to maintain is the compensation or offering other types of benefits.

According to Longenecker (2007) exists also the phenomenon of imposing personality of SME manager entrepreneurs in the choice of other employees, it turns the decision process more complex. Companies that implement and development high-tech products are more common to lead with the problem of talent retention, avoidance of talent can hinder innovation processes and cause delays in launching new products and services for IT companies (GIL, 2001).

Considering the context explained, it is in the internal environment that happen the difficulty of retaining and attracting qualified professionals, especially for managerial positions which require professional which higher cognitive level of qualifications to manage and policy the company. According to Canavesio and Martinez (2007) variables for innovation management are shown in Figure 1: research and development, human and financial resources or venture capital, funding, political and organizational culture, generation and transfer of knowledge across the enterprise and technical expertise of professionals and leaders.

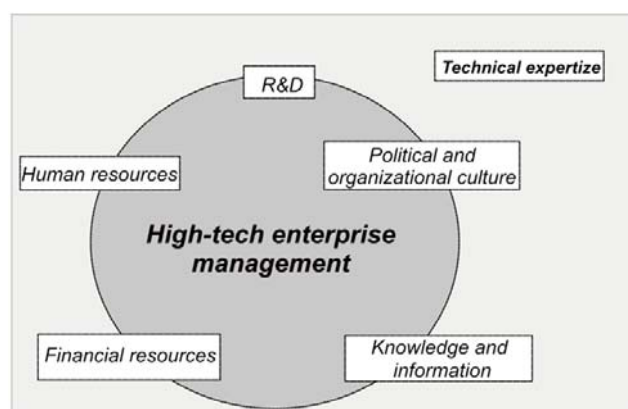


Figure 1: Variables of innovation management. **Source:** Adapted from Canavesio and Martinez (2007)

Variables of innovation management are seen as the intangible or organizational assets to SMET act better with the external environment and to get competitive advantage (YEOH & ROTH, 1999).

METHODOLOGY

This paper is characterized as exploratory to achieve the overall goal. It is consisted of surveying the literature and collecting field data of an exploratory character in material available on the subject. This study derives from the need to design an adequate explanation of the relationship between the innovation process and the flow of management information. We reviewed articles that presented relevant information to the topic of discontinuous innovation in IT product/service.

RESULTS

Smet Management Proposed Model

The correct management of information is important to SMET (SANTOS JUNIOR et al., 2005). However, does not guarantee organizational knowledge. More than information and technology, internal culture encourages SMET to sharing and learning organizational to product creative and useful knowledge (RUIZ-MERCADER, et al. 2006).

The literature states that SMET have an *ad hoc* model of management, with few hierarchical levels, as this increases such companies' flexibility and potential for innovation (GUNESEKARAN et al., 2001), develop good and strong relations, because these firms can be closer to their customers (McADAM, 2000). Rhyne et al. (2002) suggested that high-tech companies need to combine their resources: tangible resources, human capital, economic and organizational resources, in order to compete in the market. According to Rhyne and Teagarden (1995), the intangible assets of these companies are the human resources, and the information and organizational capital. It is these that should comprise the company's management strategy and it is by doing that that SMET can link them to the differentiation of the innovative products they have constructed. Therefore the mission of strategic management is to foster the development and launch of innovative products.

Smulders (2004) characterizes this process as one of individual and organizational learning. The reason for this is that company staff draw up the idea using their technical knowledge which is preserved in the SMET internal environment since knowledge is managed. And therefore, they exchange information with each other, so that transfer of knowledge takes place in the SMET. The process of managing an innovative project occurs in a dynamic view, as represented in Figure 2, where, due to leaders and stakeholders using information from earlier stages in the initial steps of each transition process, since the opportunities and needs have been exploited so as to give full shape to the innovative product. The information from each stage will be used integrated with PDCA cycle (plan, do, check and act). The process proposed by this paper consists of five steps:

- 1) Idea generation:** the ideas for new products are obtained from the internal members and external from the opportunities of the environment, and the idea must be analyzed;

- 2) Planning:** The main objective of this step is to eliminate unsound concepts prior to allocating resources;
- 3) Processing:** The ideal or concept is developed and tested using physical prototype;
- 4) Output:** The prototypes are analyzed from different points of view-business, scheduling, supplier's logistics plan, others;
- 5) Market:** launch the product, the enterprises must analyze the impact of new product on the entire product portfolio. Placing the product on the market and controlling or monitoring the project.

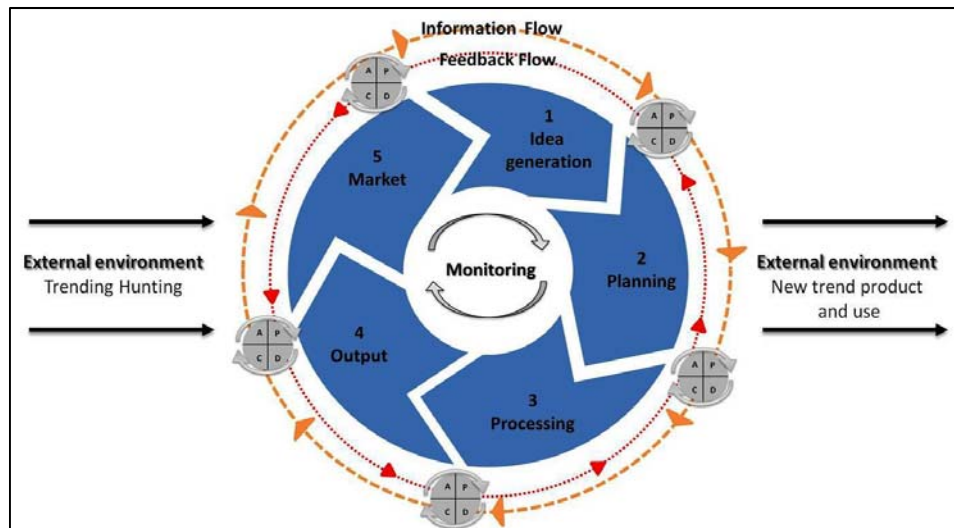


Figure 2: Innovation management cycle.

The first occurrence of the innovative life cycle is the conception of the idea of something new. It could happen: external by the influences of the environment or internal, using the knowledge by any employee of SMET (BRIGGS et al., 1997). At this point, brainstorming can be used to bring new ideas or mature old ones. The analysis helps to identify the opportunity to transform an idea into a new product or service (output). After confirming that the idea can leave the drawing board and be produced, comes the other stage: the planning. This stage analyzes and draws up the requirements for establishing a draft version of the product. A project is prepared the future actions for developing the product.

The next stage is the processing, the transformation of the inputs into a prototype. At this stage the prototype of the system of algorithms and the computer codes of the prototype are tested (first of all unit tests are made and then the system tests are conducted). If the quality of the prototype is appropriate to production requirements and meeting the needs of the demand, this stage ends and the prototype will be placed on the market as a new IT product or service.

Each interaction of the steps should be monitored by PDCA process. Improvements are included when is necessary to correct possible errors in the initial stages. These changes are influenced by four cycles of PDCA - as shown in Figure 3, each may have several loops until a unique objective is reached. Therefore, a clear definition of the objectives at the planning stage must be well-structured to monitoring and control each stage of an innovative project. It enables more assertive decisions to be taken to obtain success of the innovative output and to achieve higher return on the investment.





CYCLE →	P-PLAN 	D-DO 	C-CHECK 	A-ACTION 
1. IDEA/ PLANNING	Define the innovative product	Collect and discuss data	Match: company's resources X needs of demand	Improve the original idea
2. PLANNING/ PROCESSING	Define resources, objectives, strategies and methods	Estimate inventory prices and hold meetings to prepare idea	Check the results with initial designed performance	Improve the idea and correct mistakes in it
3. PROCESSING/ OUTPUT	Define action plans and schedule	Training and prototype production	Test the prototype on short scale	Correct the mistakes found in the prototype
4. OUTPUT/ MARKET	Define marketing goals	Data collected from market issues	Check goals and results (ROI)	Improve the idea or identify others markets

Figure 3: Description of the four phases of the PDCA at innovation cycle

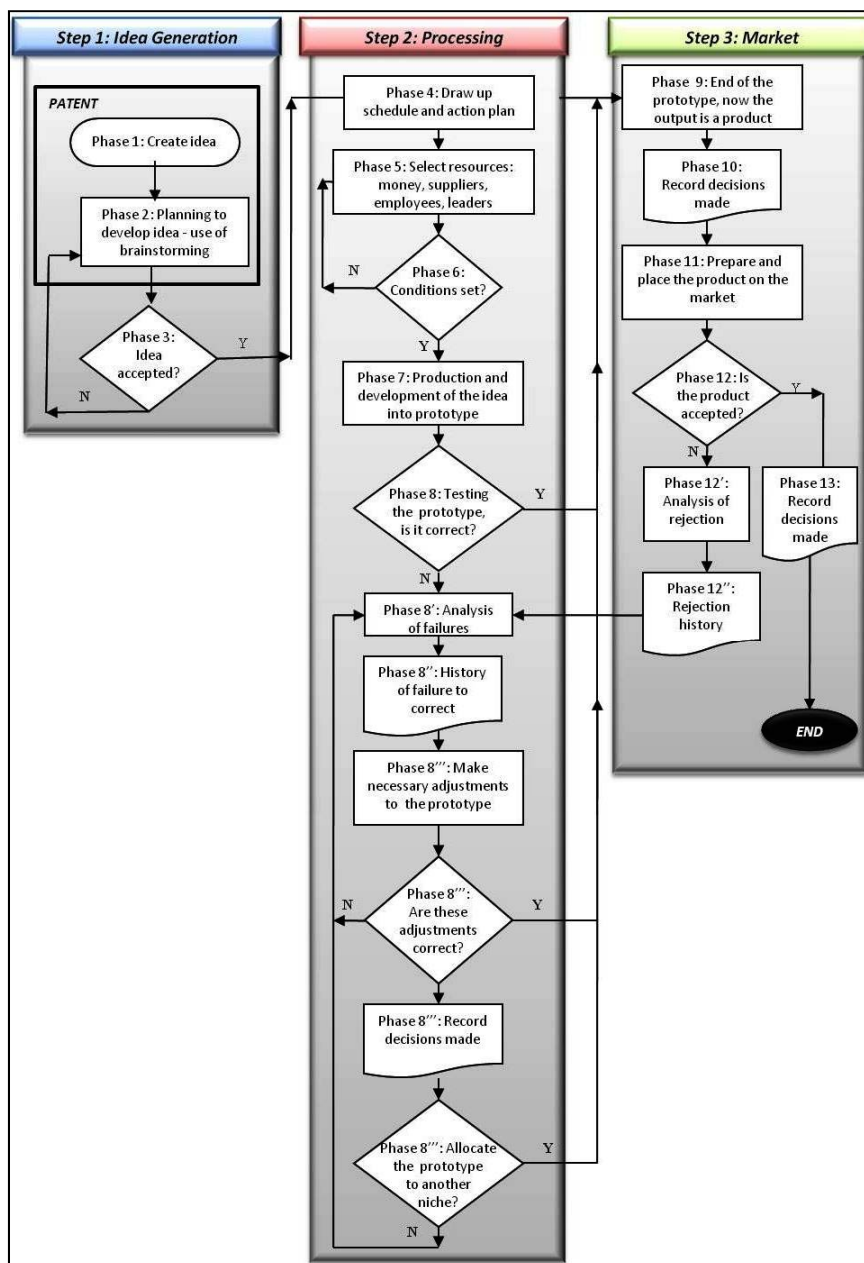


Figure 4: The innovation management diagram flow

This process takes a flexible view of the changes needed and uses them to ensure the project proceeds to the subsequent because this consists of making the input information dynamic at each stage. The problems can be solved at each stage of the PDCA cycle. This cycle re-start tot makes these stages more dynamic and according to the customer needs. But, if there is an error in the project (stage: planning) or in carrying it out (stages: processing and output), it will be cataloged to serve as an example in other stages. The errors and fails found at PDCA cycle must be analyzed to avoid wrong decisions in the future. Figure 4 presents the management flow of innovation, the process of managing innovation that happened in SMET. This involves the five stages and it occurs in three steps: *generating and* designing the idea, *processing and* planning the idea to transform it into output and putting the innovation on the market. This flow has been structured to help managers to develop innovation and is described below.

The innovation management flow proposed should provide feedback from any step in order to make improvements by means of functional and/ or technical alterations changes. Prahalad & Ramaswany (2004) argue that the basis of the competitive value is the co-creating experiences that involve the consumer. Therefore, providing positive experiences increases SMET competitive value, because their customer can identify what is different between with the new and old product/service.

Step 1: Idea Generation

The ideas of innovation born with the necessity for a new way of use, desire, manipulate a product or service. It may arise from several sources. The main source is derived from the knowledge accumulated by SMET staff (Phase 1). At this step, the idea is matured by examining how, when and the cost of placing a new product/service on the market. This analysis can be conducted by brainstorming among the company's managers and others employees who idealized the new output. When the idea is accepted the project is sent to Step 2. Should there be non-acceptance of the idea at some point in the development of the project (human resources, financial resources and raw material) in Phase 3, the project returns to Phase 2, where the brainstorming takes place, until the members of SMET find a viable solution of rejecting the idea.

The development of a new product/service depends on the knowledge and competence of all individuals who work on SMETs. At this level, the idealization and transformation of ideas into technologies to improve production processes occur. In many cases, innovation involves the patent process; ideas cannot be manipulated or copied by a competitor, because it guarantees the intellectual ownership royalties to hold the innovative operational process. In this case, the idea already patented will have incurred a high initial investment, which will have repercussions on the final price of the new product.

Step 2: Planning and Processing

In this step, the organization planning and processing the data obtained in early phases of designing the idea. The planning of the innovative project is elaborated to transformation of the idea into a prototype: In Phase 5, the leader of the process, the schedule of activity, the human and financial resources, and the suppliers of the components are defined. The ability to manufacture is checked and the development processes of the idea designed by the company are modified in accordance with the quality standards demanded by the market.

Each employee has a specific function and hierarquical power to take decisions. The team should be well integrated, and have a multifunctional view.

After aligning the conditions and resources needed to produce the prototype, in later Phases will be created for the purposes of conducting experimental tests (Phase 8), before offering the product on the market (Phase 9). In this phase, the problems in the prototype are resolved until an output is arrived at the market, which occurs in Phases 8' to 8'''. Each element of the prototype is checked so that the work can be better conducted in order to reach the final product. Then, a control is performed, i.e. assessments and modifications are made by management so as to achieve the objectives set out. The information is attached to the record for the management of knowledge.

Should some flaw be identified in the prototype, it will be analyzed (Phase 8'), the feedback of the correction will be indexed in the project for the management of knowledge, it can aid in future decision making (Phase 8'''). The last activity of Step 2 is the commercial production of the output so as to place it in the market.

Step 3: Market

The innovative output is finally produced (Phase 9) and it is prepares to be launched and introducing into the market (Phase 11). At first, the product is produced in low volume, in order to test the impact of the new product in the company's portfolio and the performance of it in the competitive environment. This is done to improve or ratify the manufacturing process, distribution of the company and suppliers, and the estimates of volumes and profit. If the innovation product is rejected (Phase 12'), it will be considered as a creative idea, only. This has not been able to attend the needs of demand, which will be seen by managers and leaders as financial drop, those are only sustaining innovation and insignificant to get highest level of market share.

This period was high investment to transform the idea and has SMET informational data on the actual market share, is waiting for the financial return. The answer to this question comes from the market itself (Phase 12), if the product will be well received it may be classified as a star or cash cow, otherwise, is classified as a dog - will damage the company, this should not compose

the SMET portfolio. The information of a rejection and decisions product are cataloged for knowledge management (Phase 12" and 13).

The time to restart the entire process of elaboration and development of an idea happens during a positioning of a product/service into the market. When the product reaches this phase, the team and manager of the innovative design will not be responsible for the marketing and the positioning of it. The activities of merchandising are the responsibility of another area from SMET that deals directly with the market (CHOU, 2003). It is the team and the manager who takes care of innovative projects that will meet for the composition or improvement of a project (WANG, 2003).

The Importance of the Proposed Model

The proposed model needs an active participation of the SMET managers and staff to develop the innovative idea. The management must focus on quality to create value emphasizes by customers. In this proposed model each phase does not depends on the previous step.

The core competences and the decision maker's behavior in relation to the PDCA cycle are important to aggregate the information and the value between each step of the innovative flow. However, manager has the power and influence to provide the support that staff needs to develop, design and implement the innovative product while maintaining quality throughout by PDCA cycle.

The first products to reach the market get higher prices and attain higher sales growth within a certain period, until the product stabilizes and is no longer considered an innovative product. To understand what happens with the product launched, SMET must analyses: planning and budgeting processes, documents, and others database; performance benchmarking by a similar product/service; details of customers voices; workflows that coordinate the activities and deliverables of an innovative supply chain. This allows the development and performance of the innovation to be viewed rationally as a dynamic feedback. This evaluation of the innovation management (Figure 1) elaborated in each Phase (Figure 2) of the diagram flow, involves the stakeholders.

Despite their importance, innovation processes are neglected by many SMET managers. The major obstacle is characterized by the size of the organizational structure of small and medium enterprises, and the proliferation of the concept of innovative output.

The model proposes has an active participation of the manager about what, when and how innovation and others members of SMET companies can develop an idea. In addition with this point, the proposed model minimizes the impact of the misunderstanding about how the idea can turn into an output. The major obstacle is the obstacle of it is characterized by the ad hoc structure of SMET management.

CONCLUSION

Innovation has stimulated the search for new alternatives ways to compete. In this sense, facilitate the use of new opportunities and incorporate them in the management of innovation is the strategic link to the competition (SCHUMPETER, 1989). According to this, SMET develop the influence on management practices, using their employee's knowledge to turn the new idea into a new product/service. But, organizational learning is a decisive factor for the SMET to innovate constantly.

However, only skills and core competences are not able to drive innovation, alone. So facilitating loans to SMET is one of the solutions to cope with their obstacles, in Brazil there are already instruments of both economic and grant cash financial, as the federal and local support for innovate projects. SMET need to manage the development of its innovative products, and need to transform human skills of its technology on their products/services.

In the proposed model, the first products reaching the market reach higher prices and higher sales growth within a certain period, until it stabilizes and is no longer considered an innovative product (WALKER and BROWN, 2004). Thus, the extent SMET performs certain activities better than its competitors; it will be getting a competitive advantage align the lifetime of each output (CETINDAMAR et al., 2009). It allows the organization monitored the quality of output product for the first of these to target the market and achieve higher prices and stronger sales in a short time.

This proposed model needs a senior management performance. And SMET firms must not limit the skills and the capability to use it in a creative way to improve innovative ideas into new products.

REFERENCES

- ANPEI/ABDES. **Mercado Brasileiro de Software**. Associação Brasileira de Empresas de Software, 2008.
- AZEVEDO JUNIOR, D.; CAMPOS, R.. Definição de requisitos de software baseada numa arquitetura de modelagem de negócios. **Produção**, São Paulo, v.18, n.1, p.26-46, 2008.
- BRIGGS, R.; REINIG, B.; SHEPHERD, M.; NUNAMAKER, J.. Quality as a function of quantity in electronic brainstorming. In: **Proceedings of the thirtieth annual Hawaiian conference on system sciences**. Los Alamitos, IEEE, p.94-103, 1997.
- BURGELMAN, J.; DUCATEL, K.. ICTs and employment in Europe: Outlooks to 2010. **Communications & Strategies**, n.38, p.309-331, 2009.
- CANAVESIO, M.; MARTINEZ, E.. Enterprise modeling of a project-oriented fractal company for SMEs networking. **Computers in Industry**, v.58, p.794-813, 2007.
- CETINDAMAR, D.; PHALL, R.; PROBERT, D.. Understanding technology management as a dynamic capability: A framework for technology management activities. **Technovation**, v.29, n.4, p.237-246, 2009.
- CHOI, B.; LEE, H.. An empirical investigation of KM styles and their effect on corporate performance. **Information & Management**, v.40, n.5, p.403-441, 2003.

- CHOU, S.. Computer systems to facilitating organizational learning: IT and organizational context. **Expert Systems with Applications**, v.24, n.3, p.273-280, 2003.
- CROSS, R.; BAIRD, L. L.. Technology is not enough: Improving performance by building organizational memory. **Sloan Management Review**, v.4, n.3, p.69-78, 2000.
- DOU, H.; DOU JR, J. M.. Innovation management technology: experimental approach for small firms in a deprived environment. **International Journal of Information Management**, v.19, n.5, p.401-412, 1999.
- FORMAN, H.. Business development success in SMEs: a case study approach. **Journal of Small Business and Enterprise Development**, v.15, n.3, p.606-622, 2008.
- GIL, A. C.. **Gestão de pessoas: enfoque nos papéis profissionais**. São Paulo: Atlas, 2001.
- GUNESEKARAN, A.; LOVE, P.; RAHIMI, F.; MIELE, R.. A model for investment justification in information technology projects. **International Journal of Information Management**, v.21, n.5, p.349-364, 2001.
- HUDSON, M.; SMITH, D.. Implementing strategically aligned performance measurement in small firms. **International Journal of Production Economics**, v.106, n.2, p.393-408, 2007.
- IBGE. **Pesquisa Anual de Serviços Ano Base 2006**. Brasil: IBGE, 2006.
- IBGE/PINTEC. **Pesquisa de Inovação Tecnológica**, 2007. Brasil: IBGE, 2007.
- LONGENECKER, G. J.; MORRE W. C.; PETTY W. J.; PALICH, E. L.. **Small business management: an entrepreneurial emphasis**. Thompson Learning, 2007.
- MASSA, S.; TESTA, S.. Innovation and SMEs: Misaligned perspectives and goals among entrepreneurs, academics, and policy makers. **Technovation**, v.28, n.7, p.393-407, 2008.
- McADAM, R.. The implementation of reengineering in SMEs: a grounded study. **International Small Business Journal**, v.18, n.72, p.29-45, 2000.
- NETTO VALERIO, A.. **Gestão de Pequenas e Médias Empresas de Base Tecnológica**. São Paulo: SEBRAE, 2006.
- O'REGAN, N.; SIMS, M. A.. Identifying high technology small firms: a sectoral analysis. **Technovation**, v.28, n.7, p.408-423, 2008.
- OLAVE, M.; AMATO NETO, J.. Redes de cooperação produtiva: uma estratégia de competitividade e sobrevivência para pequenas e médias empresas. **Gestão da Produção**, v.8, n.3, p.289-318, 2001.
- PRAHALAD, C. K.; RAMASWANY, V.. **The future of competition**. Harvard Business School Press, 2004.
- RHYNE, L.; TEAGARDEN, M. B.. International technology-based competitive strategy: a literature review and integrative model. **Journal of High Technology Management Research**, v.6, n.2, p.1-18, 1995.
- RHYNE, L.; TEAGARDEN, M. B.; PANHUYZEN, W. V.. Technology-based competitive strategies: The relationship of cultural dimensions to new product innovation. **Journal of High Technology Management Research**, v.13, n.1, p.249-277, 2002.
- RUIZ-MERCADER, J.; MEROÑO-CERDAN, A.L.; SABATER-SÁNCHEZ, R.. Information technology and learning: Their relationship and impact on organizational performance in small businesses. **International Journal of Information Management**, v.26, n.1, p.16-29, 2006.
- SANTOS JUNIOR, S.; FREITAS, H.; LUCIANO, E.. Dificuldades para o uso da tecnologia da informação. **RAE eletrônica**, São Paulo, v.4, n.2, p. 31-45, 2005.
- SCHUMPETER, J.. **Business cycles: a theoretical, historical and statistical analysis of the capitalist process**. Philadelphia: Porcupine, 1989.

SMULDERS, F. E.. Co-operation in NPD: Coping with Different Learning Styles. **Creativity and Innovation Management**, v.13, n.4, p.263-273, 2004.

WALKER, E.; BROWN, A.. What Success Factors are Important to Small Business Owners? *International Small Business Journal*, v.22, p.577-594, 2004.

WANG, E.. Effect of the fit between information processing requirements and capacity on organizational performance. **International Journal of Information Management**, v.23, n.3, p.239-247, 2003.

WOOLGAR, S.; GOMES, J.; EZINGEARD, J.; GRIEVE, R.. Abilities and competencies required, particularly by small firms, to identify and acquire new technology. **Technovation**, v.18, n.8, p.575-584, 1998.

YEOH, P.; ROTH, K.. An empirical analysis of sustained advantage in the U.S. pharmaceutical industry: impact of firm resources and capabilities. **Strategic Management Journal**, v.20, n.7, p.637-653, 1999.