

Idea Management: Idea Generation Stage with a Qualitative Focus

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Abstract—Faced with an increasingly changing business environment, being flexible and more innovative has become an obligation for organizations. To better innovate and remain competitive, organizations must use all their knowledge, proficiencies and abilities of people to consistently create new creative products and services. Our work is centered on the beginning of the innovation process, commonly referred to as “Fuzzy Front End” focusing on Idea generation for new product development. The current paper presents a qualitative approach for managing idea generation stage within an innovation management process in order to ensure an improved quality of the first draft of Idea generation stage outputs. This paper presents a theoretical construct, defined as a qualitative approach to manage the emergence of Idea that aims to support activities of the Front End of innovation. We first present the global context of this work, the LifeCycle and the core concepts adopted for the idea generation. Next, we explore and discuss based on a set of defined characteristics some of existing creativity techniques. Then, we provide an overview of the quality concept in order to guide our research on developing a qualitative approach to support the idea generation stage. Finally, we conclude with future research directions for implementing the developed approach.

Index Terms—idea management, idea generation, creativity, collaboration, knowledge, learning, quality, approach

I. INTRODUCTION

If innovation is an important issue for existence of organizations and improvement of its competitiveness, a successful innovation requires to be well-managed and carefully planned. Although there are quite a lot of solutions for innovation management, few of them provide features dedicated to the previous and crucial stage of emergence of ideas. However, many authors have for many years shown the importance of these early stages in the ultimate success of an innovation [1]. As reported by Amabile & al., “All innovation begins with creative ideas. We define innovation as the successful implementation of creative ideas within an organization”

[2]. According to this view, it's apparent that an innovative idea can clearly make the difference between success and failure when it comes to developing products or services. In our research, we focus on novel product ideas and novel products as one of the essential bases for long-term competitiveness [3].

When an organization develops a new product, it typically considers several hundred of ideas or alternatives, then selects a few of these for further development. At this stage of idea generation, the existing literature exhibits two major gaps that need to be taken into consideration. First, most papers focus on the number of ideas generated as opposed to their quality, with the tacit assumption that quantity leads to the quality. Second, the few papers that look at the quality of ideas look at the average quality of ideas generated as opposed to the quality of each idea, ignoring what most organizations seek, a few great ideas. This research attempts to address a significant need to develop a qualitative approach for managing idea generation, and shed light on this highly relevant but under-researched phase of the product innovation process.

The next section introduces the global context of the study and highlights the main characteristics that we believe, can fundamentally support the idea generation stage and considerably affect the quality of ideas outputs. Section 3 presents an Overview of existing idea generation techniques, evaluates them and provides a synthesis of important learning gathered. Section 4 describes the quality concept, defines the quality of idea generation outcomes and presents the approach. The paper concludes with a summary of the key directions for future research.

II. CONTEXT OF THE STUDY

The main purpose of this section is to present the global context of the study, define and discuss some key concepts which characterize the idea generation stage.

A. Idea Management: Definition and Life Cycle

Idea management is an integrated part of the innovation process. It principally represents the process

where ideas are solicited from employees, captured and then evaluated in order to determine which have the greatest potential to add value to the organization. In the approach proposed by Hansen & Birkinshaw, Idea management is facilitating the flow from idea generation to idea conversion in the innovation value chain [4]. In addition, it has also been termed the “Fuzzy Front End” [5] and is often classified as unpredictable and unstructured. In our study, we disagree with this last view because we suppose that well structured and defined processes must be used in order to better manage ideas and therefore better innovate.

Our research forms part of a project aimed to manage innovation in organizations with a specific focus on idea management which is proposed by EL BASSITI and presented in his article “Toward an Innovation Management Framework: A Life-cycle Model with an Idea Management Focus”. Fig. 1 below represents the new proposed lifecycle model¹.

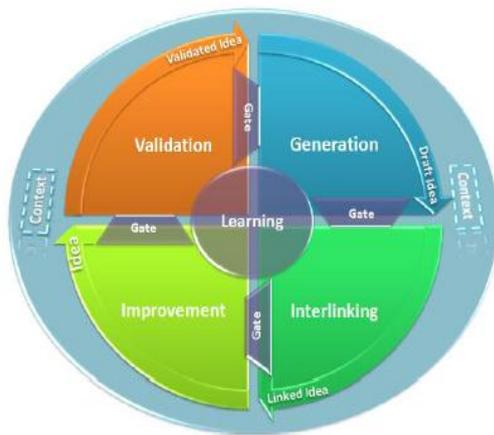


Figure 1. Idea Management Life Cycle [6].

The main aim of this lifecycle is to manage idea from its emergence until it's moving towards the project phase or its abandonment. This lifecycle consists of four key parts: four stages: *Generation* where new ideas are identified and formulated; *Interlinking* where created ideas are interlinked to other innovation deliverables and actors' profiles; *Improvement* where interlinked schemas of idea profile are transformed into a workable concept through collaboration; *Validation* where current ideas are validated and the most promising one are selected, followed by decision points "Gates" that are planned to sift the attractive ideas, knowledge engine that enable learning to occur and flow, and contextual factors to keep alignment with organization's strategy, goals, needs... [6].

As for us, we focus our empirical study on the generation stage, the first stage which is largely still unstructured in the most organizations. As mentioned earlier, most of prior research focuses on the number of ideas generated as opposed to their quality, or on the average quality of ideas generated as opposed to the quality of each idea. On our part, we estimate that if the

quality of each generated ideas initially is higher, the mean quality of the ideas created will certainly be higher. However, the objective of our research is to ensure an improved quality of each generation stage outcome called Draft Idea, and also a continuous improvement of quality throughout this phase.

B. Idea Generation

The stage of idea generation, also called "ideation", whose objective is individual or collective identification of new ideas or opportunities, is often recognized as one of the highest leverage point for an organization [7]. This is the creative stage where new ideas are generated and/or new opportunities identified. According to Titus, idea generation, or the act of generating novel, applicable ideas, is the activity most frequently associated with creative problem solving (CPS) [8]. Osborn stated that individuals are likely to experience the greatest difficulty during idea generation [9]. All this shows that idea generation phase is crucial to the success of the innovation process and should be taken seriously. It is important to recognize that the idea generation stage, while a distinct stage on its own, is also repeated throughout the innovation process. Not only does idea generation help you create and surface new innovations to develop, it also is a critical element of all the other stages in the process, from developing ways of prototyping selected ideas to conceiving of effective approaches for spreading and replicating a proven innovation [10].

Although ideas are initially generated from employees, they can also be generated from external sources such as customer interactions, markets and competitors. Thus, it is nevertheless appropriate to capture, retain and preserve all ideas even if they are “outside the box”, i.e. not aligned with organizations' context. Capturing ideas is also important in order to keep a history of new ideas, since many times ideas that are rejected due to current circumstances, can become more viable in the future [1]. Titus concludes that “old ideas never die”, they can be kept until more appropriate circumstances for their application [8]. However, the aim of this stage is to actively generate new ideas, and then to collect, capture, improve, organize and store them for further development.

C. Key Concepts

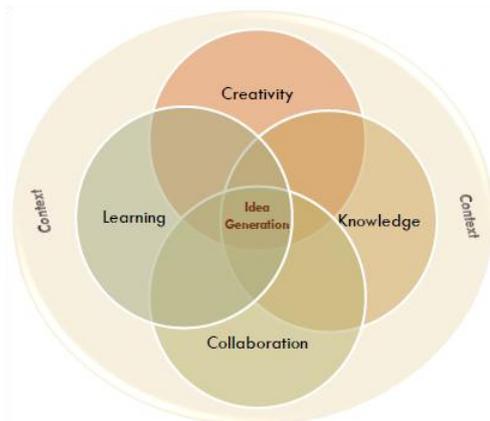


Figure 2. Dimensions of idea generation.

¹ For more details see: L. Elbassiti, R. Ajhoun, “Toward an Innovation Management Framework: A Life-cycle Model with an Idea Management Focus,” in *Proc. 3rd JCIMT*, Vol. 4, No. 6, pp. 551-559, December 2013.

Based on the foundations of the lifecycle construct [6], we regard in the same way the following key concepts (Figure below) as a means to advance the idea generation process and contribute to improvement of outcomes quality.

In what follows, we provide a more detailed understanding of the relationship between each of these concepts and organization's ability to generate and develop high quality stream of ideas.

Creativity: Each innovation necessarily starts with the generation of creative ideas. According to Muirhead, a basic definition of creativity is the ability to produce novel (original/unexpected) work that is high in quality and is appropriate (useful) [11]. Psychologists, for their part, usually define creativity as the capacity to produce ideas that are both original and adaptive. In other words, the ideas must be both new and workable or functional. Thus, creativity enables a person to adjust to novel circumstances and to solve problems that unexpectedly arise [12]. Also Titus has defined creativity as "the birth of imaginative new ideas" [8]. From this standpoint, creativity may be viewed as the process of generating ideas. It is the ability to generate ideas about products, services or procedures that are novel and potentially useful, by combining existing ideas, changing or reapplying them in different ways for new purposes.

Regardless of its different definitions, creativity is also social in nature and it is widely acknowledged that any creative idea or artefact arises from the relationship between the individual creator, others and the environment [13]. Thus, the context including – social processes, management policies and situational influences–plays an important role in organizational creativity, and consequently in idea generation.

Knowledge: Nowadays, Knowledge represents the most significant resource of a firm. The organization that wishes to cope dynamically with the changing environment needs to be one that creates information and knowledge [14]. Cognitive scientists have identified knowledge, skill and prior experience among several abilities which are important for creative work [15]. Thus, knowledge gives the person the ability to explore a rich domain much more efficiently, and therefore imagine new things. Furthermore, diversity in knowledge leads to increased number and variety of ideas. According to several scholars, informal and face-to-face interaction of individuals, especially with different backgrounds, gives rise to novel product ideas [16]. As noted by Buchanan, background knowledge is an essential element that distinguishes deliberate acts of creation from "accidental creativity" [15]. Thus, knowledge not only aids creativity, it also supports idea generation. So, it is absolutely urgent to consolidate and synthesize the existing knowledge, and encourage the continuous interaction of knowledge.

Hence, the idea generation can be defined as the process that combines knowledge into new value by allowing individual and organizational knowledge to be shared, assimilated and transformed to produce new knowledge and thus new ideas. This is based on the notion that the generation of new ideas is based on new knowledge [17]. However, it's clearly apparent that

having too much knowledge supported by efficient knowledge management techniques and tools can considerably affect the idea generation outcomes quality.

Collaboration: Innovation is fundamentally a collaborative effort. Great ideas are rarely created by a solitary genius. More often, innovation comes from the right network of people and teams bringing disparate ideas together [10]. Moreover, new ideas are usually formed when people of different backgrounds, knowledge, expertise and interests talk to each other. This therefore implies an interaction between the different actors and disciplines within the organization in order to deliver innovative products and services. Although individuals may at times work alone to produce ideas, interactions and collaboration with others and the external environment are crucial to produce creative ideas and artefacts [18]. This implies that the environment in which one is situated can stimulate and evoke creativity by igniting a creative idea [13]. In addition, collaboration allows getting more ideas, developing and refining them to finally arrive at high-value breakthrough ideas. It also can serve as an instrument to engage everyone in creative thinking about renewal and improvements, where employees from any unit can contribute to the idea generation process. This group work leads from creative sparks to novel ideas [19].

Collaboration nurtures emergence, which can often lead to unexpected opportunities [10]. However, it is important to adopt a creative environment which harnesses the diversity and collective intelligence of all its members, and thus place internal and external collaboration at the center of idea management effort.

Learning: As idea generation is an activity to retrieve existing knowledge from memory and to combine them into novel ones, it can be regarded as a form of learning in the sense of psychological activity. People acquire new knowledge, not by being taught or by acquiring in other ways existing knowledge, but rather they develop this knowledge anew, as it does not exist yet [20]. According to Schank, learning takes place when the person is able to relate new concepts to previous situations and experiences [21]. However, creative ideas can be inspired by previous situations and experiences through learning. Talking about learning led us also to talk about organizational learning that is defined as a collaborative effort where individuals create new ideas by sharing their knowledge through interaction with others [6]. So, learning can be viewed as the ability to adapt old solutions to new problems, to combine multiple existing ideas into a new concept, to try new things, and to acquire, create, share knowledge and transform it into valuable insight that accelerates innovative thinking and thus generates new ideas. Only a culture willing to experiment, test, and learn will be able to produce new creative ideas and sustain innovation over time.

As a result, it's important for the organizations to provide more attention to the learning culture by creating environment that promotes collaborative inquiry, experimentation, tolerance for risk, and an acceptance of and commitment to learning from setbacks or failures.

D. Summary

We can synthesize that although the dimensions—creativity, knowledge, collaboration and learning—were explored individually, it is important to acknowledge that they are somewhat overlapping. In fact, it is the sum of the whole rather than the individual parts that significantly affect the quality of the generated ideas and enhance idea generation stage in idea management process. Furthermore, we can also note that each of these concepts is aligned with a context which may concern the strategy, culture, domain and structure in which the individual is situated.

If we retake all these dimensions, a new definition of idea generation for new products will be: “**Idea generation** is the process in which creative thinking based on knowledge and learning from prior experience is used to individually or collectively produce novel ideas adapted to the context wherein they are spawned”.

III. LITERATURE REVIEW OF IDEA GENERATION TECHNIQUES

To succeed the activities of idea generation stage, it is necessary to stimulate people's imagination to create innovative ideas. As a result, a large number of techniques have been invented and described, but only a few are applied often. These techniques assist individuals to break free from cognitive, habitual, and mental association and pattern of thought [22], and thus explore new routes. It should be noted that these techniques also called “creativity techniques” can be reused repeatedly throughout the idea generation stage. Some of them will be more detailed in this section with the goal of understanding their strengths, weaknesses and limitations.

A. Overview of Idea Generation Techniques

As part of our research, we collected, selected and analyzed a large amount of techniques. Towards this goal, we picked them on the basis of the following criteria:

- **Coverage:** Cover the various existing categories of idea generation techniques (intuitive and logical methods [23]),
- **Variety:** Techniques that allow generating various ideas whether it be internally, externally, individually or collectively,
- **Adequacy:** Techniques which are used in response to the goals and current needs of organizations and adapted to the context.

An overview of the selected techniques is summarized below.

1) Brainstorming (Osborn, 1957)

Brainstorming is a collective reflection method that allows, from a working group to find one or many solutions to a given problem. It's based on the principle of free association of ideas and the creative impulse of the participants. The goal of this method is to obtain a sequence of positive mutual associations through sustained discussion of all participants, to generate a maximum of proposals whose judgment and evaluation will occur in later. This technique was invented before all others, so it is also known as “the mother of idea

generation techniques”. Brainstorming is specifically designed to maximize participants' ideational output [24].

The primary purpose of this method is to produce a large number of ideas with a group of participants in response to a given problem with an ‘open’ formulation.

2) Brainwriting (Rohrbach, 1968)

Brainwriting is a group creativity technique, also known as the 6-3-5 Method of Brainwriting. It was developed for six participants, but can easily be adapted for a different number. Each participant is given a piece of paper, and asked to write down three ideas or solutions to a defined problem during a five-minute interval; afterwards, each sheet of paper is passed on to a neighbor in order to refine the existing solutions or to come up with new ideas. Participants are encouraged to draw on others' ideas for inspiration, thus stimulating the creative process. In a similar way to brainstorming, it is not the quality of ideas that matters but the quantity [25].

The purpose of this group method is to come up with lots of ideas in a cyclical way to a defined problem. The outcomes are recorded on a specific worksheet.

3) Mind mapping (Buzan, 1974)

Mind Mapping is a very powerful graphic technique because it unlocks the potential of the brain; it also helps to express emotions and strengthen memories. It specially reflects the natural organic movement of human brain. The goal of this method is to organize; retrieve and create knowledge, think carefully and intelligently, and solve problems from available information. Mind mapping technique starts always with a single idea or thought, which then incurs more follow-up concepts. At the end, it connects all related thoughts and presents them together as a graph [26].

The primary purpose of this structured method is to solve problems from available knowledge and represent the outcomes graphically.

4) Suggestion box (Teian in Japanese)

The box is used for collecting slips of paper with input from customers and patrons of a particular organization or internally within an organization from all employees. This method inspired by the goal of continuous improvement of Kaizen Japanese technique, allows any employee of the company, whatever his hierarchical level and his qualification, to communicate at any moment his thoughts and to make his new ideas known. If his idea is accepted and that its application is particularly interesting, he will be entitled to compensation according to defined rules [27].

The purpose of this method is to gather suggestions, additional comments or new ideas in slips of paper developed individually and from different sources.

5) SCAMPER (Eberle, 1971)

SCAMPER was developed by extending Osborn's brainstorming recommendations, and convolve them into an extended ideation technique. SCAMPER is an acronym for the following set of categories and actions: Substitute, Combine, Adapt, Modify, put to other uses, Eliminate, and Reverse. The method presents the user with a set of possible action operator categories to generate ideas that may be used to develop solutions to a design problem(s). For each operator category, a set of

questions suggest reflection and an action. These questions help to come up with creative ideas for developing new products, and for improving current ones [28].

The primary purpose of this group method is to come up with creative answers to a defined set of questions in order to improve existing products or developing new ones.

6) *Synectics (Gordon, 1960)*

Synectics is a method based on a systematic use of analogies to generate ideas. Analogies are directly or indirectly, the symbolic representation of problems and solution in other areas (e.g. Nature, history, economy ...). Through metaphor, Synectics empowers to make meaningful connections between ideas, connections that take advantage of experiences and understandings. Spontaneous remarks of participants are resumed, developed and visualized. Checking their possibilities of realization and returning to the original problem can lead to new solutions [29].

The purpose of this collective problem solving method is to learn from prior experiences and use a metaphorical process to generate new ideas to the original problem.

7) *TRIZ (Altshuller, 1946)*

TRIZ is a Russian acronym, and its English translation is Theory of Incentive Problem Solving (TIPS). TRIZ helps to analyze problems, pinpoint contradictions and enables a focused search for possible solutions. Based on critical analyses of historical inventions, a set of fundamental design principles was inductively derived aiming to discover and eliminate technical and physical contradictions in solutions. It is highly structured, with the procedures for applying it clearly defined and well elaborated [30].

The primary purpose of this method is to find inventive solutions to an identified problem. It includes a knowledge base and model-based technology for generating them.

8) *Idea Jam (IBM, 2001)*

Also known as “Innovation Jam”, is the largest-ever event to promote networked idea generation. It is an online collaboration event (Forum) that brought together a global audience of people representing nonprofit organizations, corporations, academic institutions, and government agencies across ideology and geography. More than 150,000 employees and external persons participate in two three-day online events to discuss challenges in service, to share and develop ideas on pre-selected topics of broad interest, solve real-world problems. The management of the Jam is based on the concept that “every idea counts” and people can raise their ideas freely [31].

The purpose of this collaborative method is to bring different minds and different perspectives together to discover new solutions to long-standing problems.

9) *Crowdsourcing (Howe, 2006)*

Crowdsourcing is a newly developed term which refers to the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the

form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals. The crucial prerequisite is the use of the open call format and the large network of potential laborers. It is a web based business pattern, which make best use of the individuals on the internet, through open call, and finally get innovative solutions [32], [33].

The primary purpose of this participative method is to obtain ideas, needed services or solutions by soliciting contributions from a large group of people especially from an online community.

B. Discussion

As we have seen, several techniques for creativity and idea generation with different approaches exist. As mentioned earlier (Section II), a successful idea generation must consider a set of characteristics. The main characteristics highlighted above are:

- 1) Link to creativity management: Produce novel and creative ideas.
- 2) Link to knowledge management: Retrieve and create knowledge.
- 3) Link to collaboration management.
- 4) Link to learning management: Learn from prior experience.
- 5) Interaction with the organization’s context.

Relatively to these characteristics, any process for managing ideas must also take into account:

- 6) Quantity: The total number of ideas generated by a group when it uses a certain idea generation method.
- 7) Quality of idea generation outcomes.

Based on these 7 characteristics and the detailed description of each technique, we evaluated the creativity techniques presented above according to their objective and use. The table below presents a summary of this evaluation.

TABLE I. THE COMPARISON OF THE IDEA GENERATION TECHNIQUES

Technique/Criterion	C1	C2	C3	C4	C5	C6	C7
Brainstorming	√	×	√	×	√	√	×
Brainwriting	√	×	√	×	√	√	×
Mind Mapping	√	√	×	×	√	√	×
Suggestion Box	√	×	×	×	×	√	×
SCAMPER	√	√	√	×	√	√	×
Synectics	√	√	√	√	√	×	×
TRIZ	√	√	×	√	√	×	×
Idea Jam	√	×	√	×	√	√	×
Crowd sourcing	√	×	√	×	√	√	×

As a result, we can conclude that:

- ✓ The bulk of these idea generation techniques does not respond or respond poorly to the defined characteristics. Indeed, each technique has benefits but also limitations;
- ✓ Most of techniques allow the generation of a wide range of ideas, but does generating a large number of ideas effectively breeds the quality?

- ✓ In respect to their purposes, most if not all of techniques are intended to increase the quantity of ideas generated, as opposed to their quality;
- ✓ In all techniques, Creativity is frequently and primarily associated with Creative problem solving, and not the production of novel ideas to new products;
- ✓ Most techniques concentrate on combining, adapting or refining existing ideas;
- ✓ There exists no 'one best way', no generally applicable technique to generate new ideas for new products. In fact, most techniques are principally used in response to new challenges or new opportunities that emerge such as problem-solving, product improvement...;
- ✓ The suitability of a technique or another in a certain situation depends on the treated problem, applicative context as well as the availability of data and preferences of participants.

Although a large number of ideas can be generated with support tools, it is hard to generate creative ideas with high-quality because the range of thought tends to be extremely limited under various constraints. Following this discussion, we can synthesize that using only creativity techniques to generate high quality ideas are not enough. Therefore, there is a need for integrating an approach with a qualitative perspective that aims to ensure continuous improvement of ideas generated quality, and thus increase the organization's innovation capability.

IV. QUALITY CONCEPT

A. Definition

Quality is perceived differently by different people. However, many definitions of quality are available in the literature [34]:

- A definition attributed to quality guru Crosby states the following: *Quality is conformance to requirements*. This preceding definition assumes that the specifications and requirements have already been developed. The next thing to look for is conformance to these requirements.
- Another frequently used definition comes from Juran: *Quality is fitness for use*. This definition stresses the importance of the customer who will use the product.
- Another definition that is widely accepted is: *Quality is the degree to which performance meets expectations*. This definition provides a means to assess quality using a relative measure.

While different definitions of quality exist, quality denotes generally an excellence in services meeting customer needs and providing value to them as well.

Talking about product quality lead us to talk about idea quality since a new product cannot emerge without new idea. Ideas are the potential starting point for any innovation venture and by understanding and supporting idea processes in front end innovation especially in generation step; organizations can strengthen their

innovative capability. The success of idea generation in innovation usually depends on the quality of the best opportunity identified. However, we focus our research on quality improvement of ideas generated during idea generation stage.

Hence the idea to integrate a qualitative approach in this first stage in order to enrich the existing lack in this regard, improve idea generation process and outcomes in terms of quality, and thus accelerate the innovation management process.

B. Quality within Idea Generation

The existing idea generation literature that looks at the quality of ideas defines idea quality as:

- In the literature on creative idea generation, idea quality is usually defined as a combination of feasibility and originality [35] [36],
- Quality is a measure of the feasibility of an idea and how close it comes to meet the design specifications [37],
- Some of the definitions that have been used are (1) originality, (2) feasibility, (3) effectiveness, (4) importance, and (5) uniqueness [38].

Although various definitions exist, there is still little agreement among researchers as to what constitutes quality of ideas. Most operational definitions of quality are specific to the particular task the subjects are asked to do [38], but they are not enough, in our view, to sufficiently guarantee the expected quality.

In order to respond to this need, we have based the idea quality definition on the dimensions of idea generation highlighted before and which represent the foundation keys of our qualitative approach. We define idea quality as a multi-dimensional construct where creativity, knowledge, collaboration and learning work together to develop successful new high-value ideas. Our vision to idea quality in each dimension is described as follows:

In **Creativity**, we define quality as the ability to produce new, original and useful idea. However, access to existing knowledge and ideas of others can stimulate creativity.

In **Knowledge**, we define quality as the ability to combine acquired knowledge through sharing, interaction and learning into new value to produce new knowledge and thus new ideas.

In **Collaboration**, we define quality as the ability to nurture, refine and develop collectively an idea. Employee participation and commitment is critical to ensure the quality of idea generation outcomes.

In **Learning**, we define quality as the ability to benefit from previous experience and take advantage from their result. Learning is crucial to develop new knowledge.

C. Towards Qualitative Approach

This sub-section presents the qualitative approach which was developed in response to an increased need to support activities at the generation stage and ensure an improved quality of the first draft of Idea generation stage outputs. Additionally, the aim of this approach is to help organizations to identify, create, develop and implement

new ideas for new products and services more efficiently and effectively.

Our approach is based upon the following model:

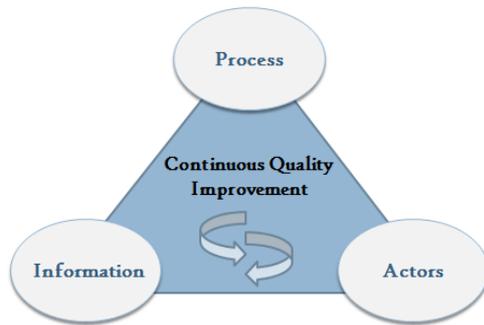


Figure 3. Model of quality.

The model is centered on quality improvement which is guided and supported at the top by the organization structure and processes, its people and culture, as well as information and knowledge.

- **Process:** The quality of the innovative idea and consequently of the related product strongly depends on the quality of the process—including strategy, structure, culture, leadership, climate, technology—used to develop and implement the innovation. However, to encourage creative thinking and reach the quality of outcomes, organizations need to rethink their strategy, create a climate that enables the active construction of new ideas, develop a more open culture which respects the free flow of ideas and adopt a creative environment which harnesses the diversity and collective intelligence of all actors.
- **Actors:** Human capital is a “Key ingredient to organizational success and failure” [6]. It is obvious that people inside the organization - actors which practice the art of creative thinking - represent the most important source of innovative ideas and are one of an organization's greatest assets. So, actors should have the deep personal motivation to contribute to a project by their respective ideas, the desire for personal expression, for collaborating to advance shared ideals. However, a motivated team composed of engaged and implicated actors with diverse expertise and experiences, can certainly produce innovative ideas with higher quality that are helpful in attaining a goal.
- **Information:** The very crucial fertilizer for the idea generation stage is information: information about current problems, about organizational strategies and objectives, about clients and markets, about technologies.... Therefore, by efficiently and effectively identifying, capturing, categorizing or classifying, and presenting information and knowledge, these can act as an important stimulus for the generation of new ideas [1]. To fully exploit and utilize all knowledge resources, organizations should develop Integrated Knowledge Networks to support the quality

improvement by making the right information available to the right people in the right context and at the right time, this can help to trigger new and innovative ideas.

V. CONCLUSION AND FUTURE WORK

The present paper addresses the idea generation phase in the product innovation process, a context that has thus far received only very limited research attention.

This paper has introduced the context of the study, presented the idea generation stage and attempted to better understand this stage through the evaluation of its dedicated techniques based on a set of defined characteristics. Furthermore, it should be noted that creativity techniques are not a magic wand. Therefore, a combination of all identified key factors is absolutely needed for generation success and continuous quality improvement.

Finally, a research initiative for future idea generation support tool was established based on the limitations of current techniques. Further work should be made to identify the most suitable and appropriate technique to adopt as well as possible improvements to bring in order to implement this approach and respond to our goal which is to improve the quality of idea generation outcomes.

REFERENCES

- [1] N. D. D. Preez and L. Louw, “A framework for managing the innovation process,” presented at the Portland International Conference on Management of Engineering and Technology PICMET, pp. 27-31, Cape Town, South Africa, July 2008.
- [2] T. Amabile, R. Conti, H. Coon, J. Lazenby, and M. Herron, “Assessing the work environment for creativity,” *Academy of Management Journal*, vol. 39, no.5, pp. 1154-1184, 1996.
- [3] R. M. Henderson and K. B. Clark, “Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms,” in *Strategic Management of Technology and Innovation*, R. A. Burgelman, M. A. Maidique, S. C. Wheelwright, Ed. Jai Press, Greenwich, 2001, pp. 9-30.
- [4] M. T. Hansen and J. Birkinshaw, “The innovation value chain,” *Harvard Business Review*, vol. 85, no. 6, pp. 121-130, June 2007.
- [5] D. W. Dahl and P. Moreau, “The influence and value of analogical thinking during new product ideation,” *Journal of Marketing Research*, vol. 39, pp. 47–60, 2002.
- [6] L. Elbassiti and R. Ajhoun, “Toward an innovation management framework: A life-cycle model with an idea management focus,” *International Journal of Innovation, Management and Technology*, vol. 4, no. 6, pp. 551-559, December 2013.
- [7] O. Toubia, “Idea generation, creativity, and incentives,” *Marketing Science*, vol. 25, no. 5, pp. 411–425, 2006.
- [8] P. A. Titus, “Marketing and the creative problem-solving process,” *Journal of Marketing Education*, vol. 22, no. 3, pp. 225-235, 2000.
- [9] A. F. Osborn, *Applied Imagination: Principles and Procedures of Creative Thinking*, New York: Scribners and Sons, 1963.
- [10] G. Kasper and S. Clohesy. (August 2008). Intentional Innovation: How Getting More Systematic About Innovation Could Improve Philanthropy and Increase Social Impact. [Online]. Available: http://www.monitorinstitute.com/downloads/what-we-think/intentional-innovation/Intentional_Innovation.pdf
- [11] B. Muirhead, “Integrating creativity into online university classes,” *Educational Technology & Society*, vol. 10, no. 1, pp. 1-13, 2007.
- [12] D. K. Simonton. (2014). The Psychology of Creativity: A Historical Perspective. [Online]. Available:

- http://psychology.ucdavis.edu/faculty_sites/simonton/HistoryCreativity.pdf
- [13] Fasko, "Education and creativity," *Creativity Research Journal*, vol. 13, nos. 3 and 4, pp. 317-327, 2001.
- [14] C. Gore and E. Gore, "Knowledge management: The way forward," *Journal of Total Quality Management*, vol. 10, nos. 4 and 5, pp. 554-560, 1999.
- [15] B. Buchanan, Creativity at the Metalevel. AAAI-2000 Presidential Address. *AI Magazine*, vol. 22, no. 3, pp. 13-28, 2001.
- [16] V. Peltokorpi, I. Nonaka, and M. Kodama, "NTT DoCoMo's launch of imode in the Japanese mobile phone market: A knowledge creation perspective," *Journal of Management Studies*, vol. 44, no. 1, pp. 50-72, 2007.
- [17] R. W. Woodman, J. E. Sawyer, and R. W. Griffin, "Toward a theory of organizational creativity," *Academy of Management Review*, vol. 18, no. 2, pp. 293-321, 1993.
- [18] H. Gardner, *Five Minds for the Future*, Cambridge, MA: Harvard Business School Press, 2007.
- [19] F. M. R. Armbrrecht Jr., R. B. Chapas, C. C. Chappelow, G. F. Farris, P. N. Friga, C. A. Hartz, M. E. McIlvaine, S. R. Postle, and G. E. Whitwell, "Knowledge management in research and development," *Research Technology Management*, vol. 44, no. 4, pp. 28-41, 2001.
- [20] P. Dolog, Y. Lin, P. P. Grube, and K. Schmid, "Creativity support at the workplace," in *Proc. the 2nd International eLBA Science Conference*, June 2009.
- [21] R. Schank, "What we learn when we Learn by doing," *Technical Report No. 60*, Institute of Learning Sciences, Northwestern University, Illinois, 1995.
- [22] C. M. Ford, "Creative development in creativity theory," *Academy of Management Review*, vol. 25, no. 2, pp. 284-285, 2000.
- [23] J. J. Shah, S. V. Kulkarni, and N. Vargas-Hernandez, "Evaluation of idea generation methods for conceptual design: effectiveness metrics and design of experiments," *Journal of Mechanical Design*, vol. 122, no 4, pp. 377-384, 2000.
- [24] A. F. Osborn, G. Rona, P. Dupont, and L. Armand, *The Constructive Imagination: How to Take Advantage of Its Ideas, Principles and Process of the Creative Thought and Brainstorming*, Dunod, Paris, 1971.
- [25] B. Rohrbach, Creative by rules - Method 635, a new technique for solving problems, first published in the German sales magazine "Absatzwirtschaft", vol. 12, pp. 73-75 and vol. 19, 1 October 1969.
- [26] T. Buzan and C. Griffiths, "Mind Mapping for managers," *Trans. B. Vad é 1st ed.*, Eyrolles, Ed. Organisation, Paris, 2011.
- [27] D. Janssoone, "The suggestion box: A wealth for organization," Ed. EMS, 2003.
- [28] B. Eberle, *Scamper: Games for Imagination Development*, Waco, TX: Prufrock Press, 1996.
- [29] W. J. Gordon, *Synectics: The Development of Creative Capacity*, New York: Harper and Row, 1961.
- [30] G. Altshuller, *40 Principles: TRIZ Keys to Innovation*, L. Shulyak and S. Rodman, Trans. 1st ed. Worcester, MA: Technical Innovation Center, 1997.
- [31] O. M. Bjelland and R. C. Wood, "An inside view of IBM's 'innovation jam'," *MIT Sloan Management Review*, vol. 50, no. 1, pp. 32-40, 2008.
- [32] J. Howe. (June 14, 2006). The rise of crowdsourcing. *Wired*. [Online]. Available: <http://www.wired.com/wired/archive/14.06/crowds.html>
- [33] J. Howe. (June 2, 2006). Crowdsourcing: A definition. *Wired Blog Network: Crowdsourcing*. [Online]. Available: http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing_a.htm
- [34] T. R. Chandrupatla. (2009). *Quality and Reliability in Engineering*. [Online]. Available: http://assets.cambridge.org/97805215/15221/excerpt/9780521515221_excerpt.pdf
- [35] D. Dahl. (2011). Lightning in a Bottle: Managing Ideas to Spur Innovation. ACRL 2011: A Declaration of Independence. [Online]. Available: http://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfsnational/2011/papers/lightning_in_bottle.pdf
- [36] E. F. Rietzschel, B. A. Nijstad, and W. Stroebe, "The selection of creative ideas after individual idea generation: Choosing between creativity and impact," *British Journal of Psychology*, vol. 101, no. 1, pp. 47-68, 2010.
- [37] J. J. Shah, S. V. Kulkarni, and N. Vargas-Hernandez, "Evaluation of idea generation methods for conceptual design: Effectiveness metrics and design of experiments," *Journal of Mechanical Design*, vol. 122, no. 4, pp. 377-384, 2000.
- [38] E. F. Fern, "The use of focus groups for idea generation: The effects of group size, acquaintanceship, and moderator on response quantity and quality," *Journal of Marketing Research*, pp. 1-13, 1982.



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