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Classification of innovation projects

Mozhgan Entekhabi and GH. Abbas Arabshahi*

Industrial Management Institution, Khorasan Razavi, Mashhad, Iran

***Corresponding author**: Dr. Abbas Arabshahi, Industrial Management Institution, Khorasan Razavi, Mashhad, Iran.Email: Abbas_arabshahi@yahoo.com*

Abstract

Today the only way to survive in competitive markets is through innovation and creativity, which play an important role in the success of an organization. In comparison with the conventional projects, innovative projects are challenging and impose enormous costs to companies and organizations, so classifying and breaking innovative projects can be worthwhile to reduce the risk of performing. From the managerial point of view, classification of innovative projects plays a significant role in reducing time and cost for companies. Over the past few years, the innovative process was considered by several researchers, but there is a gap between classification of innovative and conventional projects. In this research we try to answer this question; is there any factor to classify innovative projects? This paper attempts to explain a general classification of innovative project and their details in different field of science. The research design applied to this paper was content analysis. After reading this paper, you can classify all the innovative projects. Our aim is to achieve an overall model to explain and separate all innovative projects.

Key word: Innovation, Innovative project, Research project, Technology projects.

Introduction

This paper is concerned with four topics and the interplay between them, namely “Innovation”, “Research projects” and “Development projects” “and “technology projects”. Classifying is important because measuring and evaluating of complexity and risk could be easier. Innovation can be defined as all the scientific, technological, organizational, financial, and commercial activities necessary to create, implement, and market new or improved products or processes (OECD, 1997). Alann Afuah, professor in Corporate Strategy and International Business at the University of Michigan Business School, defines innovation as “the use of new technological and market knowledge to offer a new product or service that customers will want.” New technological and market knowledge is used to create a product that costs less, has improved attributes, has new attributes, and has not previously existed in the market. Evaluating of individual innovation projects is challenging because of dynamic opportunities, project interdependencies, multiple goals and strategy considerations, unreliable or changing information and multiple decision makers (Cooper *et al*, 2001).

Due to the economic development as a larger share of the today’s competitive markets, it is essential to know the classification and the process of innovation project. The purpose of innovation is to create business value. That value can take many different forms, such as incremental improvements to existing products, the creation of entirely new products and services, or reducing costs, etc. (Langdon Morris, 2008). Here, there are some definition of classification: A group of individuals ranked together as possessing common characteristics; as the different classes of , the educated class, the lower classes. A comprehensive division of animate or inanimate objects, grouped together on account of their common characteristics, in any classification in natural science, and subdivided into orders, families, tribes, genera, etc . Several typologies and classification of projects have been developed, e.g. (Wheelwright *et al*.1992, Turner and Cochrane 1993, Dvir *et al.* 1998, Turner 1999), For the purpose of our analysis we aim to determine the position of innovative projects and its details. We are going to expand the framework which Sergey Filippow; Herman Mooi (Delft University of

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GENERATION	Key features
First and second	The linear models: market pull and technology push
Third	Interaction between different elements and feedback loops between them, the coupling model
Fourth	The parallel lines model, integration within the firm, upstream with key suppliers and downstream with demanding and active customers, emphasis on linage and alliances
Fifth	Systems integration and extensive networking, flexible and customized response, continues innovation

Fig 1: Rothwell's five generations of innovation models

technology, department of innovation systems research at delft center for project, the Netherlands) were considered in their paper. The paper is structured as follows. Section 2 is about the literature of paper which contains definitions, brief review of innovation history and research design followed in section 3 we present a conceptual framework and its details and we conclude in section 4.

Literatures

Innovation

In this part we review some definition of innovation. The term innovation derives from the Latin word innovates, which is the noun form of innovate "to renew or change," stemming from in-"into" + novus-"new". Although the term is broadly used, innovation generally refers to the creation of better or more effective products, processes, technologies, or ideas that affect markets, governments, and society. Innovation differs from invention or renovation, in that innovation generally signifies a substantial change compared to entirely new or incremental changes (Rad, 2009). The introduction of new goods, new methods of production, the opening of new markets, the conquest of new sources of supply and the carrying out of a new organization of any industry (Peter Drunker, 1993). Innovation is a new element introduced in the network which changes, even if momentarily, the costs of transactions between at least two actors, elements or nodes, in the network (Joseph Schumpeter, 2007). Innovation is the way of transforming the resources of an enterprise through the creativity of people into new resources and wealth (Regis Cabral, 1998). Innovation does not relate just to a new product that would come into the marketplace. Innovation can occur in processes and approaches to the marketplace, finally:

$I = \alpha F (C, K, c, k)^{ns}$

I =Innovation; α = a need or willingness to embrace innovation; c, C= creativity, either on a personal (c) level or an organizational (C) level; k, K= existing knowledge or know how at personal (k) or organizational (K) level n = the effectiveness or maturity of the innovation processes put in place (David Schmittlen, 1982).

Innovation history

In this part of literature, we review the innovation history. Roy Rothwell, was a key researcher for many years in the field of innovation management, working at SPRU at the University of Sussex. He classified the innovation models as fifth-generation innovation. His classification is mentioned below: (Fig. 1)

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		Core concept	
		Reinforced	**Overturned**
Linkage between core Concepts & components	Unchanged	**Incremental innovation** Example: Lumber wall truss frame replacing conventional stick-built lumber wall frame	**Modular innovation** Example: Extruded metal truss frame replacing conventional stick-built lumber wall frame
	Changed	**Architectural (Systemic) innovation** Example: Prefabricated wall frame with HVAC,[15] plumbing & electrical components replacing conventional stick-built lumber wall frame	**Radical innovation** Example: Geodesic dome frame replacing conventional stick-built lumber wall frame

Fig .2: Innovation framework Detailing categories of innovation scope core

Levels of innovation

In the past few years Innovation were categorized and classified according to several factors such as intensity or complexity or uncertainty and etc. In this paper we try to expand innovation classification, now we are going to mention to some of them;

Henderson and Clark (1990) introduced the concept of architectural innovation (what we describe in this paper as systemic innovation). They investigated several seemingly straightforward innovations that resulted in significant consequences for the photolithographic alignment in equipment industry. Their goal was to understand which characteristics of those innovations were unique. Henderson and Clark's research suggested that the linkage between the core concepts and the components in a product or process innovation were important factors in describing the landscape of the types of innovations. This convention is particularly useful for exploring innovations in the project-based residential building industry. Fig. 2 illustrates the Henderson and Clark innovation model and gives examples of building industry innovations for each category.

Modular and radical innovations require significant changes in the product. In cases of modular and radical innovations, new firms will typically enter the market to exploit the construction of these new products. In these cases, regulatory concerns play a key role in determining the acceptance of a new product entering the residential building market. On the other hand, incremental and systemic innovations require subtler changes. The existing firms in the industry are required to modify their building process. Because the existing product concept is reinforced, issues of code compliance are typically not raised. In manufacturing industries, systemic innovations can diffuse quickly as Henderson and Clark discovered in their analysis of the photolithographic alignment equipment industry. Interesting issues arise at the intersection of work within and across project teams for incremental and systemic innovations. These issues begin to explain the problems related to systemic innovation diffusion (Fig. 2).

Kathryn A. Baker, 2006 defined innovation and levels of innovation besides considered three main types of innovation (process, product/service, and strategy), each of which can vary in the degree of newness (incremental to radical) and impact (sustaining versus discontinuous). There are also important relations between these types of innovation. For example, a strategy innovation may necessitate process, and/or product innovations.

As the term broadened, innovations were seen as ranging from incremental to radical. This distinction primarily focused on the extent of newness. An innovation can be new within a particular context or new in terms of the overall marketplace of ideas. Similarly, it can be a new twist on an old theme or a radically novel idea. This distinction did not, however, clearly differentiate between newness and impact. In terms of impact, the effect of an innovation can range from: (1) contributing to fairly small improvements to products or to the way things are done, (2) causing a fundamental transformation in the resulting products or services and/or the process technology of an entire industry, or (3) transforming the market place and/or the economy as a whole. Christensen (1997) advanced the concept of innovation by disentangling the attributes of newness and impact. Because, radically new innovations do not always have a significant impact, he differentiates between sustaining versus discontinuous innovations. Sustaining innovations improve the performance of established products or services. Discontinuous innovations bring to market very different products or services that typically undermine established products and services in the particular market sector. An example of a discontinuous innovation is steel mini mills (while the product was not significantly changed, a change in the production process led to a drastic change in prices, firms, and markets). A discontinuous innovation does not always have greater utility; it may, in fact, result in a product that under-performs established products. The reason for this is that the momentum of on-going sustaining innovations can push product and service functionality beyond what many customers may actually require (in other words, the establish products and services eventually overshoot a large segment of their market). He advises companies in all industries to be continually attuned to a potentially discontinuous innovation that could cause their demise if they do not quickly adapt and adjust to the fundamentally changing situation.

Types of Innovation

There are three main types of innovations (process, product/service, and strategy), each of which can vary in the degree of newness (incremental to radical) and impact (sustaining versus discontinuous).

a. Process Innovation

Process innovation became an important topic with the rise of the quality and continuous improvement movements and, then again, with the more recent attention directed at change management, organizational learning and knowledge management. Corporations today, at least in the developed world, are reaching the limits of incremental process improvement. Some have argued that what is needed today is radical process innovation. Hammer & Champy (1994) introduced the concept of radical reengineering based on their assertion that for companies to achieve maximum efficiency and effectiveness requires radical process reengineering of the organization and its processes. Because processes lag far behind what is possible given technological advancement, it is not possible to achieve the necessary transformation through incrementalism. The argument for radical reengineering seemed plausible and many organizations undertook large scale reengineering efforts. The results, however, have been mixed. Many organizations spent a great deal of time and money for little pay-off (Carter 1999). There are several competing explanations for these failures, including an explanation proposed by one of the initial advocates. Champy (1996) suggests that management has often been a barrier and that successful reengineering of the corporation requires that management itself be radically reengineered. Others suggest that organizations are often not capable of changing as much and as quickly as radical reengineering encourages and that transition management has not been sufficiently addressed (Feldman, 1999). There have been two main problems with reengineering: (1) an ambitious model of the reengineered corporation without a sufficiently detailed and realistic plan of how to manage current operations while transitioning to the new model and (2) a lack of the sustained effort

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needed to ensure success. In addition, as Carter (1999) notes, downsizing has too often posed as reengineering and, not surprisingly, downsizing tends to have short-term and limited benefits. The clear lesson is that radical engineering to be successful must be done with great care and that balance and caution must be exercised.

Discontinuous process innovation can originate outside the industry and/or may be more or less serendipitous. Thus, in addition to intentional process improvement and reengineering, companies must take care to monitor and have the ability to quickly adapt to potential innovations that could affect how they currently operate.

b. *Product/Service Innovation*

Incremental product/service innovation is oriented toward improving the features and functionality of existing products and services. Radical product/service innovation is oriented toward creating wholly new products and/or services. Product life cycles, in particular, have become shorter and shorter, causing business survival to depend on new product development and, increasingly, on the speed of innovation in order to develop and bring new products to market faster than the competition (Jonash & Sommerlatte, 1999). Organizations must direct greater attention to new product development, while maintaining and improving their existing products. Discontinuous products and services are increasingly likely with ever-faster new product/service development. Organizations must be constantly on the lookout for discontinuous new products and/or services. Although product/service innovation and process innovation are not the same thing, they are often interconnected. For example, process innovation may be required to support product or service. Many American and British companies have reached the point of diminishing returns in their cost-cutting and efficiency programs. In 1999, the average operating margin for the non-financial services companies in the S&P 500 was 15.7%, the same as 5 years earlier. Indeed, between 1994 and 1999, the average operating margin for these companies never varied by more than 1.3 percentage points (Hamel, 2000). Also, it has been argued that organizational processes and structures oriented to incremental product innovation are not the same as those needed to foster and facilitate new product development. The current wisdom it is necessary to separate these activities and to introduce wholly new process innovations that will help promote and speed-up radical product innovation.

Strategy or Business concept Innovation

It is, of course, possible to incrementally improve one's business strategy but Hamel (1996, 2000) contends that the radical business concept of innovation is now paramount. He claims that the current environment is hostile to industry incumbents and hospitable to industry revolutionaries. The fortifications that protected the industrial oligarchy have crumbled under the weight of deregulation, technological upheaval, globalization, and social change. What is now required to ensure organizational success is to continually revolutionize the basic organizational strategy, which progressively typically requires:

- ♦ Radically preconceiving products and services, not just developing new products and services
- ♦ Redefining market space
- ♦ Redrawing industry boundaries

If radical business concept innovation is successful in accomplishing these objectives, it is by definition discontinuous.

Drivers of Innovation

The primary drivers of innovation include:

- ♦ Financial pressures to decrease costs, increase efficiency, do more with less
- ♦ Increased competition
- ♦ Shorter product life cycles
- ♦ Value migration
- ♦ Stricter regulations
- ♦ Industry and community needs for sustainable development
- ♦ Increased demand for accountability
- ♦ Community and social expectations and pressures (giving back to the community, doing good, etc.)
- ♦ Demographic, social, and market changes
- ♦ Rising customer expectations regarding service and quality

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- ♦ Greater availability of potentially useful new technologies coupled with the need to keep up or exceed the competition in applying these new technologies
- ♦ The changing economy.

Innovation Project and Classification

The capacity to innovate is an important strategic option for many firms and countries. It is also a central and enduring research theme for academics, which have spent the last 70 years defining, explaining and measuring innovation in its many forms. A popular and fundamental approach that has accompanied these studies is the classification of innovation, which is both a process (to classify) and an output of the process (a classification). The classification provides models for ordering, labeling, and articulating knowledge about the diversity of innovations. Classification helps us to arrange and structure our knowledge in a way that is more fruitful and transferable than a simple list of descriptions. The classifications of technical change and innovation, and its interpretation, remains one of the most difficult problems for scholars to analyze, due to the several variables involved and because the innovation can have different causes of origin. As classification is a common process in the physical life and social sciences: the result is a diverse range of interpretations and frequent misuse of classification terms, theories and methods. Although the words "category" and "taxonomy" are almost synonyms, they are very different in age. As early as 2,300 years ago, the father of all taxonomies, Aristotle, often used the word "Kathegoría". The word taxonomy is, on the contrary, a recent one, dating to the first half of the eighteenth century. Several scholars, including Linnaeus, to classify minerals and animal and botanical species used it. The scientists and philosophers of the Enlightenment introduced this neologism by recovering an ancient Greek word (táxon, arrangement and array) and associating it to nómos. Since then, the word has been very successful and is still used in natural sciences to classify species, minerals and the phenomena. It should be noted that the term flourished in the natural sciences a century before Charles Darwin proposed his theory of evolution, though in more recent times taxonomies have tried to describe and explain the static characteristics of objects as well as their evolving patterns. Over the last decades, the word has also been imported in social sciences. Taxonomies are meant to classify phenomena with the aim of maximizing the differences among groups. The term taxonomy refers to a branch of systematics concerned with the theory and practice of producing classification schemes. Thus, constructing a classification is a taxonomic process with rules on how to form and represent groups (taxa), which are then named (nomy). The social sciences have two general approaches to classification: the empirical and theoretical. The principal difference between these two social science approaches is the stage at which a theory of differences is proposed and evidence then sought to validate the theory (Warriner, 1984; Rich, 1992; Doty & Glick, 1994). Theoretical classifications in the social sciences begin by developing a theory of differences, which, then results in a classification of organizational types, known as typology. Only when the classification has been proposed, is a decision made as to where an entity belongs in the classification. With the empirical approach, social science classifications begin by gathering data about the entities under study. The data are then processed using statistical methods (numerical taxonomy) to produce groups according to the measures of similarity and statistical techniques used. Thus, the overall aim is to use data to construct the classification, instead of supporting it, but in reality, data are seldom collected without an expectation about what they will reveal or validate. While, for example, “taxonomy" is considered useful, if it is able to reduce the complexity of the population studied into easily recallable macro-classes, the “classifications” are often highly desegregated, both in natural and social sciences and management (Archibugi, 2001). Although the term classification has been used throughout this paper, there is no agreement about the general use of the term. Classification as an output (a product of the process of classifying) deals with how groups and classes

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of entities will be arranged, in accord with the taxonomic approach used (Mc Kelvey, 1982). It is a framework (e.g. a matrix, a table, a dendrogram, etc.) for ordering and representing, regardless of whether a theoretical or empirical approach is used. The terms classification scheme or classification system are often used to distinguish and identify classification as an output. Examples of such schemes and systems include the Linnaean System of nomenclature, the Periodic Classification of chemical elements, the Mercalli scale, the Dewey Decimal Classification System for organizing books and other bibliographic items and the North American Industrial Classification (NAIC) and Standard Industrial Classification (SIC) systems for naming and organizing industry sectors. The purpose of this paper is to focus on similarity and/or heterogenity of taxonomies of innovation present in the economic and technologic and research fields to show as the economic and technologic literature uses different names to indicate the same type of technical change and innovation, and the same name for different types of innovation. Innovation is a complex phenomenon. For the purposes of analysis (Sergey Filippow & Herman Mooi, 2007)) intend to split innovation in to several groups depending on its "intensity". They stated that a number of project categories can be discerned under the umbrella of innovation projects, such as technology projects, research projects, new product development projects, etc. (although this is not an all-inclusive list) (Fig. 3).

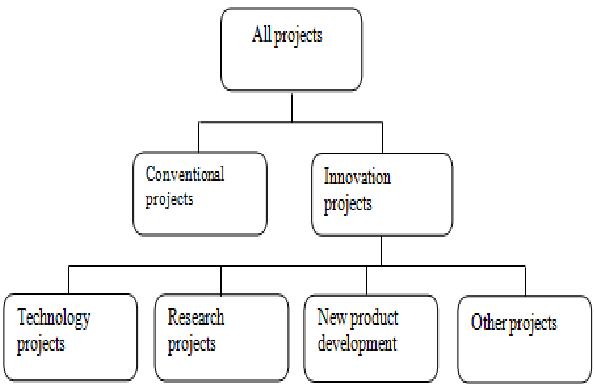

Fig 3: Schematic representation

Henderson Clark (1990) determines four types of innovation – incremental, modular, architectural and radical. Incremental innovations can be achieved by integration of supplementary technologies or by substitution or transfer of similar resources. Modular innovation stem from supplementary or even unrelated technologies, which add complementary or completely new functionalities. Architectural innovations are achieved by reconfiguring supplementary or similar technologies to build new product platforms. Finally, radical innovations emerge from the reconfiguration of unrelated technologies. Furthermore, imitation is also included, defined as creative efforts for development of a product or service, new to the specific economic agent, but existent elsewhere on the market. In the scale of "intensity" of innovation, imitation is positioned before the incremental innovation; in other words, imitation has the lowest innovative intensity. It should be noted that there are difficulties in anticipating the degree or "intensity" of innovation. According to Henderson and Clark (1990), radical innovation is defined in an ex-post evaluation. Discontinuous (also known as "radical", or "disruptive") innovations create such dramatic change that they transform existing industries or create new ones. Such an innovation generally does one or more of the following (Leifer):

a) Create an entirely new set of performance features.
b) Improve performance by 5 or more
c) Significantly reduce cost (30% or more)

As we said before the aim of this paper is expanding the previous model. In the next part, we will explain about the research design and review the method briefly.

Research design

In this research, we use the content analysis method as research design. Content analysis is a research tool used to determine the presence of certain words or concepts within texts or sets of texts. Researchers quantify and analyze the presence, meanings and relationships of such words and concepts, then make inferences about the messages within the texts, the researcher(s), the audience, and even the culture and time of which these are a part. Texts can be defined broadly as books, book chapters, essays, interviews, discussions, newspaper headlines and articles, historical documents, speeches, conversations, advertising, theater, informal conversation, or really any occurrence of communicative language (Colorado state university). It is a systematic method. Here, is a formal definition of content analysis: it is a systematic, research method for analyzing textual information in a standardized way that allows evaluators to make standardized inferences about that information. (Weber, 1990, and Krippendorff, 1980, pp. 21-27) Another expression of this is as follows: A central idea in content analysis is that the many words of the text art classified into much fewer content categories (Weber, 1990). The classification process, called "coding," consists marking text passages with short alphanumeric cods. This creates "categorical variables" that represent the original, verbal information then be analyzed by standard statistical methods. The seven major steps in conducting a content analysis are outlined below (Delfico, 1996):

1 Deciding whether to use content analysis
2 Defining the variables
3 Selecting material for analysis
4 Defining the recording units
5 Developing an analysis plan
6 Coding the textual material
7 Analyzing the data

Two different phases cover these seven steps. First phase (steps 1&2) explains deciding whether to use content analysis by considering the kinds of questions we need to answer and the material available for evaluation. The second phase which contains next five steps explains defining the variables we want to collect information about, defining the material to include in the analysis, defining the recording units about, and developing an analysis plan. According to the seven major steps, considering the innovation process, many published paper and documents were collected and evaluated.

Findings

In this section we explain the overall model of innovation classification projects. In fact this model is expansion of Sergey Filippow and Herman Mooi `s model. This classification is dependent on the size of projects, subject of projects, complexity and uncertainty. Here we view the definition of technology, research, new product development and their details.

Technology projects

The classification presented here is based on levels of technological uncertainty at the time of the project's initiation. We define the four types of projects as follows (Fig. 4),

Type A - Low-Tech Projects are those projects that rely on existing and well established base technologies to which all industry players have equal access. Although such projects maybe very large in scale, no new technology is employed at any stage. Technological uncertainty is virtually nil prior to the project's initiation. Most projects in the construction and road building industries belong to this category.

Type B - Medium-Tech Projects rest mainly on existing base technologies but incorporate some new technology or feature. Such projects are characterized by a relatively low level of technological uncertainty. The new technology or feature is what usually provides the source of the project's advantage, thus serving as its key technology. Examples include many industrial projects of incremental innovation, as well as improvements and modifications of existing products.

Type C - High-Tech Projects are defined as projects in which most of the technologies employed are new, but existent, having been developed prior to the project's initiation. Integrating several new technologies for the first time leads to a high level of technological uncertainty. Many, though not all, projects in the high-tech industry or the defense industry would normally be characterized as incorporating radically new technologies, thus making these industries the natural home for such projects.

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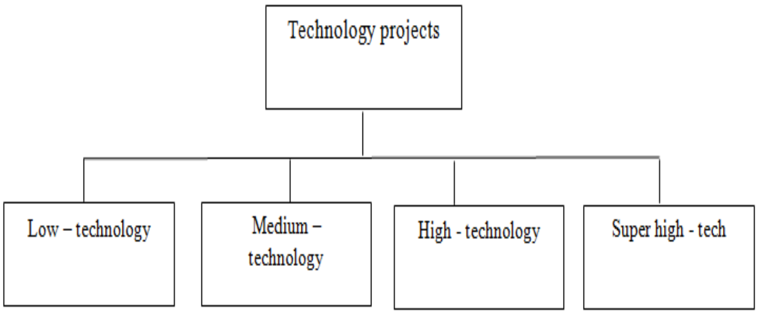

Fig 4: Types of Technology projects

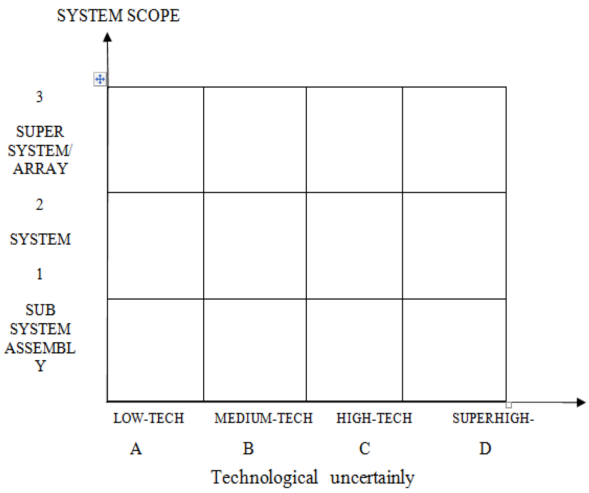

Fig 5: System Scope Vs Technological Uncertainly

Type D - Super High-Tech Projects are based primarily on new, not entirely existent technologies. Some of these technologies are emerging; others are even unknown at the time of the project's initiation.

The project's execution period is therefore devoted in part to the development of new technologies, testing and selection among alternatives. This type of project obviously entails extreme levels of technological uncertainty, is relatively rare, and is usually carried out by only a few and probably large organizations or government agencies. The system scope dimension most products are composed of components, and most systems of subsystems. For example, computer's major subsystems are its keyboard, processor, internal memory, power supply, disk drive and display unit, while the key board's components are the board base, the keys, the connectors and various other electronic parts. The notion of different hierarchies inside product or a system, with different design and managerial implications is used in (Fig. 5) as the second dimension for distinction among projects. Although our theoretical construct included initially five levels, the empirical evidence has clearly clustered around the following three levels:

Scope 1 - An Assembly is a collection of components and modules combined into a single unit. A typical assembly may perform a well defined function within a larger system, thus constituting one of its subsystems; or it can be an independent self- contained product that performs a single function of a limited scale. A radar receiver, a missile's guidance and control unit, or a computer's hard disk or printer are common examples of assemblies (subsystems) within larger systems; CD players, radios, washing machines and other appliances can be considered independent assemblies of the second kind.

Scope 2 - A System is a complex collection of interactive elements and subsystems within a single product, jointly performing a wide range of independent functions to meet a specific operational mission or need. A system consists of many subsystems (and assemblies), each performing its own function and serving the system's major mission. Radar, computers, missiles, and, for that matter, entire aircraft are typical examples of systems performing independent tasks.

Scope 3 - An Array is a large, widely dispersed collection of different systems that function together to achieve a common purpose. An array can also be considered a "super system", an expression of its nature as a conjunction or conglomeration of systems. Usually arrays are dispersed over wide geographical areas and normally consist of a variety of systems. A nation's air defense system consisting of early warning radar, command and control centers, combat aircraft and ground to air missiles is a good

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example of such a super system. Similarly, the

<table>
<tr><td colspan="2"></td><td colspan="2">Core concept</td></tr>
<tr><td colspan="2"></td><td>Reinforced</td><td>Overturned</td></tr>
<tr><td rowspan="2">Linkage between core Concepts & components</td><td>unchanged</td><td>Incremental innovation
Low –technology projects</td><td>Modular innovation
Medium –technology projects</td></tr>
<tr><td>changed</td><td>Architectural (Systemic) innovation
High –technology projects</td><td>Radical innovation
Super high – technology projects</td></tr>
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Fig 6: Types of Innovation

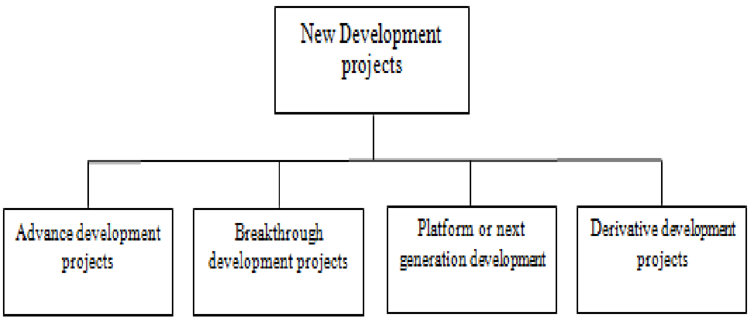

Fig 7: New development projects

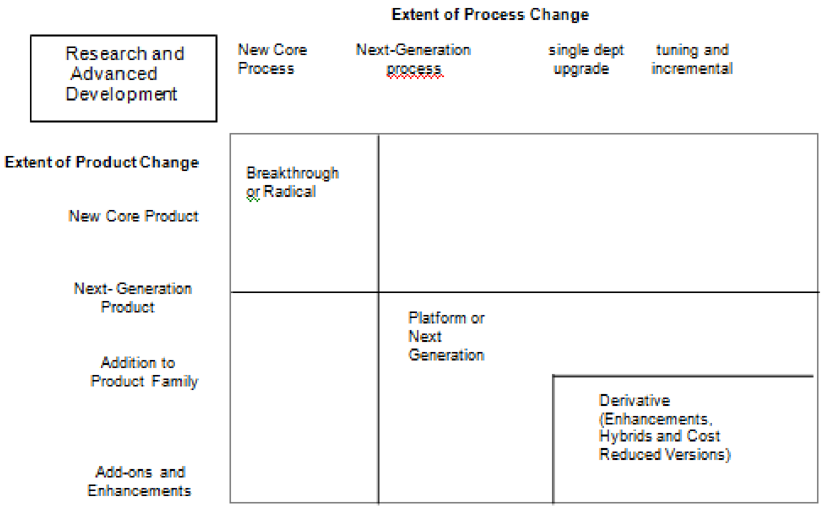

Fig 8: Types of product development projects

public transportation network of a large city may also be considered a typical array (Shenhar, and Dvir, 1995) .therefore base on classification of technology projects and also base on Henderson and Clark innovation table of innovation classification, these kind of projects are classified in this table (Fig. 6).

New Development Projects

Project classification can be based on many different dimensions, e.g., the extent of product change, the extent of target market newness, the extent of product complexity, or the extent of uncertainty of the technology used. In this section we present the classification presented by Wheelwright and Clark, since it has been used as a basis for project classification in one of our case example organizations. The four development project types presented by Wheelwright and Clark are based on the degree of product change and the degree of manufacturing process change (Fig. 7). One message is that a company should have a balanced portfolio of both of these. The project types are research or advanced development projects, breakthrough development projects, platform or next generation development projects, and derivative development projects.

The four project types are defined as follows:

Research or advanced development projects aim at inventing new science or capturing new know-how for the organization. These projects are precursors to commercial development projects. Breakthrough or radical development projects create the first generation of an entirely new product and involve significant change in the product and process technology. These projects are likely to create a whole new product family for the organization. Platform or next generation development projects provide a basis for a product

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and process family and thus establish the basic architecture for follow-on derivative projects. Derivative development projects refine and improve selected performance dimensions. These projects create for example cost-reduction versions of products and processes. The categories in (Fig. 8) are generic and organizations may benefit from tailoring more specific categories for their individual needs. Different types of projects have various needs and requirements concerning many factors, e.g., the management style applied, the scope and structure of the project, and the control mechanisms used (Kristian Rautiainen *et al.*, 2000). Base on definition of new product development project and classification of innovation project, these kinds of projects are classified as below table (Fig. 9).

		Core concept	
		Reinforced	**Overturned**
Linkage between core Concepts & components	unchanged	**Incremental innovation** Platform or next generation development	**Modular innovation** Breakthrough development projects
	changed	**Architectural (Systemic) innovation** Derivative development projects	**Radical innovation** Advance development projects

Fig 9: Concepts and components of Innovations

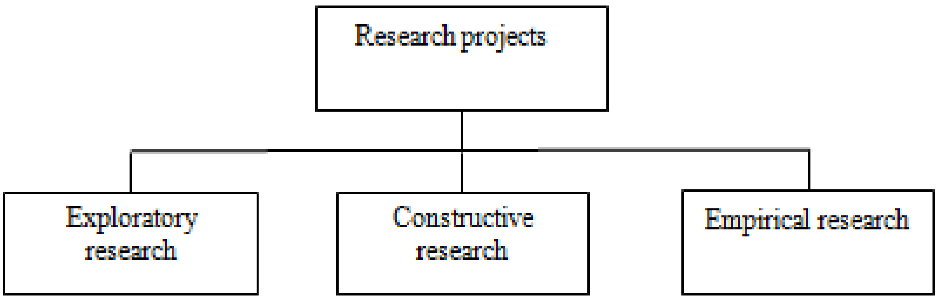

Fig.10: Research Project Schemes

Research projects

Here, we are going to define research project: research into questions posed by scientific theories and hypotheses and also scientific research that requires massive capital investment but is expected to yield very significant results. (Free dictionary by farlex, year) [19] The project produces knowledge. The knowledge may be formally represented as models, patterns or patents or the knowledge may be embedded in a working process or artifact. Examples:

- Business modeling
- Developing a model of the UK economy
- Developing a new species of wheat
- Developing novel approaches to project management.
- Military intelligence/code breaking.
- The analysis, testing, QA or evaluation portions of a larger project.

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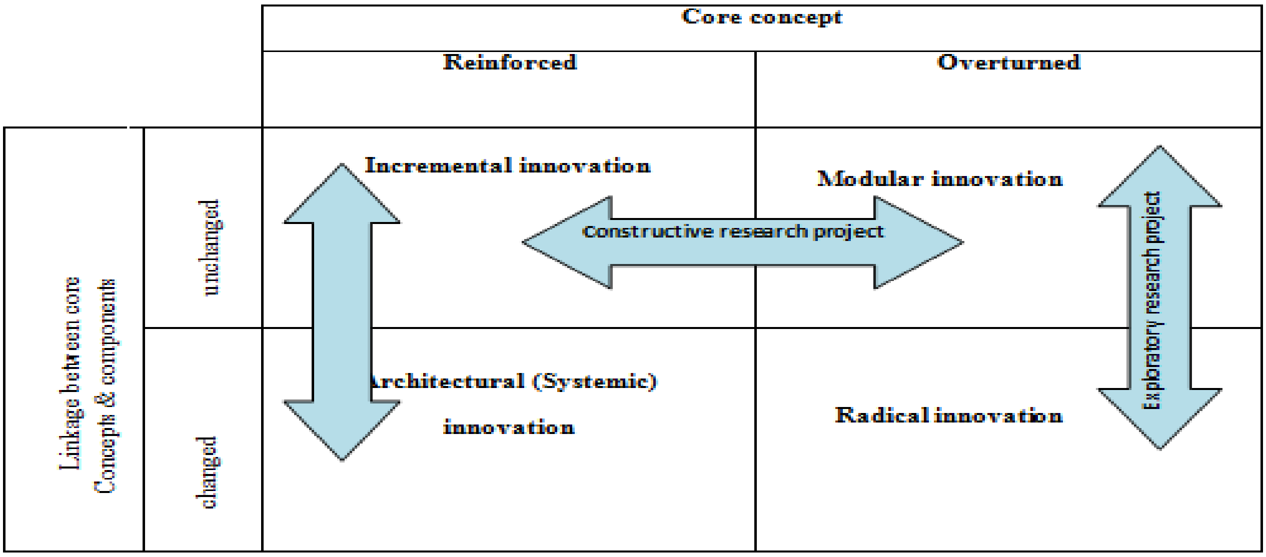

Fig 11: Core concepts

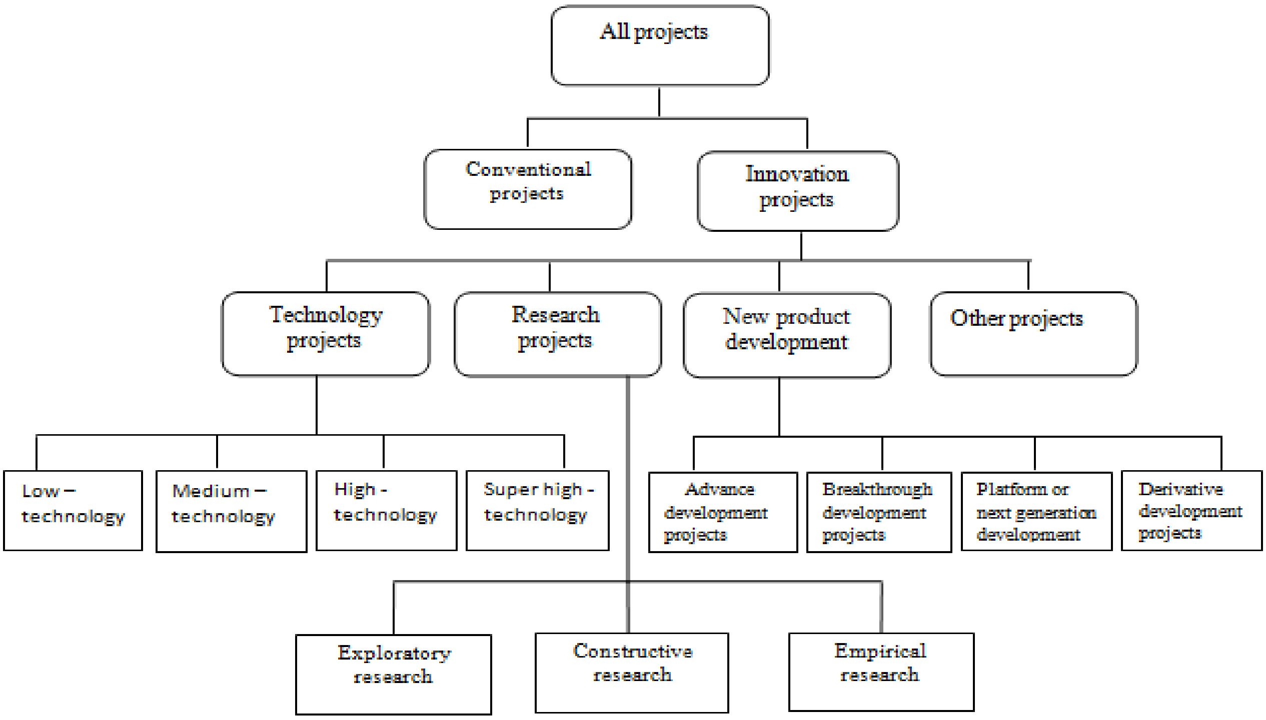

Fig 12: Overall model of Classification of innovation projects

Research is kind of a project to find out some answer or solutions for a particular area-research is kind of project because every project has its scope of work, time-line and resources, that`s why you may easily interrelate research work with a project-in fact every research work works on based on a well-devise project plan. The general perspective of research is that some scientists taking part in laboratory testing or presenting the results in scientific discovery to the world-actually this was my view of research when I was young.

The value of Research:

1. Every research works either identify new opportunities for us or give us novel ideas.

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2. Research helps us to diagnosing any known problems or opportunities;
3. Help us to establish a standard of taking action on any chosen area of the knowledge domain.
4. Evaluate and develop the current technologies and systems

Types of Research

Every Research needs lots of dedication from the researcher's part-the amount of dedication mainly depends on the subject matter of the research. Before undertaking any research in any subject areas one must be sure about the intended purpose of the research-this purpose determines what type of research one is going to undertake. Any scientific research may fall into the following three broadly categories (Fig 10):

a) *Exploratory research*-This type of research may generate any novel idea in the domain of knowledge. It is primarily done for the purpose of finding anything new in any subject arena and always tries to shed some light in the unknown domain of knowledge. This kind of research also helps us to generate new discipline in sciences and help us to identify problems of those particular research areas.

b) *Constructive research*- This is mainly done by many technological corporate in order to find new/alternative solutions to any particular crisis or problems. For example-renewable energy research or development of the capacity of optical fiber may fall into this category of research.

c) Empirical research-This is very impressive observational type of research, where one observes or test on real-life data or analyse the pattern of some specific events in order to identify the nature or the class of trend that specific phenomenon maintains. Based on the test result, researchers try to draw lines in order to predict the result of that type of incidents with certain level of confidence (Wikipedia).

Research projects start with a hypothesis and with a problem and stop when the time runs out or when we detect diminishing returns and the results are evaluated when the knowledge is confirmed or disconfirmed by later work or when the knowledge is used by later work (Research & Statistical Analysis Methods Laura Paquette, March 25, 2011).Base on the definition of different kind of research projects, these projects are classified in the below table (Fig. 11)

Conclusion

Now in final part of paper we are going to state the overall model of classification of innovation project (Fig. 12) according to the findings that are mentioned in this paper. The overall model includes most of the innovation projects with different innovation degree. This model is made according to context analysis method of related scientific subjects. We hope that this framework can be effective and useful for all people who interest in innovation and related subjects.

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