UQAC
Université du Québec
à Chicoutimi

THESIS

PROJECT RELATIONSHIP TO INNOVATION AND ITS IMPACT

WHEN PROJECT MEETS INNOVATION,

CREATING NEW VALUE WHILE DELIVERING SUSTAINABLE RESULTS.

"NEW CONCEPTUAL (PRO-INNOVA) & PRACTICAL (PROD-JECT) MODEL"

Project purpose (Pp.) = Innovation impact (Ii.)

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THESE PRESENTED AT THE UNIVERSITY OF QUEBEC IN CHICOUTIMI TO OBTAIN THE DEGREE OF

DOCTORATES IN MANAGEMENT OF PROJECTS

Québec, Canada

1 Contents

LIST OF ABBREVIATIONS

- **AIPM:** Australian Institute for Project Management
- **APM:** Association of Project Management
- **ATB:** Automated Ticket & Boarding Pass
- **ATM:** Automated Teller Machine
- **CEO:** Chief Executive Officer
- **COPS:** Complex Product Systems
- **CQ:** Cultural Intelligence
- **CS:** Central Secretariat
- **DAC:** Development Assistance Committee
- **DNA:** Deoxyribonucleic Acid
- **EBO:** Emerging Business Organization
- **EQ or EI:** Emotional Quotient or Emotional Intelligent
- **EU:** European Union
- **EU:** European Union
- **GDP:** Gross Domestic Product
- **GSQO:** Government Standard & Quality Organization
- **HR:** Human Resource
- **IATA:** International Air Transport Association
- **IBAAN:** International Bank Account Number
- **IBM:** International Business Machines
- **ICAO:** International Civil Aviation Organization
- **IEEE-TEM:** Institute of Electrical and Electronics Engineers Technology Management
- **IJPM:** International Journal of Project Management
- **IMI-JU:** Innovation Medicine Initiative Joint Undertaking
- **INSEAD:** Institut Européen d'Administration des Affaires (European Institute of Business Administration)

- **IPMA:** International Project Management Association
- **IPPM:** Innovation Project Portfolio Management
- **ISO:** International Organization for Standardization
- **IT:** Information Technology
- **JPMF:** Japan Project Management Forum
- **LoB:** Line of Business
- **MBA:** Master of Business Administration
- **MBO:** Management by Objectives
- **MOOCs:** Massive Open Online Courses
- **NATA:** National Air Transport Association
- **NPD:** New Product Development
- **OECD:** Organisation for Economic Co-operation and Development
- **OECED:** Organization for Economic Co-operation and Development
- **OT:** Online Ticket
- **PMAJ:** Project Management Association of Japan
- **PMBOK:** Project Management Body of Knowledge
- **PMCC:** Project Management Professional Certification Centre
- **PMI:** Project Management Institute
- **PMJ:** Project Management Journal
- **PMO:** Project Management Office
- **PRINCE2:** Projects In Controlled Environments
- **PROMPT:** Project Resource Organization Management Planning Technique
- **RACI:** Responsible, Accountable, Consulted and Informed
- **RFID:** Radio Frequency Identification
- **ROIC:** Return on Invested Capital
- **SC:** Success Criteria
- **SIA:** Stakeholder Impact Analysis
- **SMEs:** Small and Medium Enterprises
- **TAT:** Transitional Automated Ticket

- **TCs:** Technical Committees
- **TGMs:** Technical Group Managers
- **ToC:** Theory of Change
- **TPMs:** Technical Program Managers
- **UNOPS:** United Nations Office for Project Services
- **UQAM, UQO, UQAR:** Universities of Quebec
- **US:** United States
- **WIPO:** World Intellectual Property Organization

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ABSTRACT

At the macro and micro levels, governments, industries, and companies are constantly challenged by their stakeholders and customers to show relevance by adding a new value with innovative services, products, and solutions. The same stakeholders are simultaneously very demanding for the agile (Continuous and evolving) delivery of results with high impact. Both competing and often contradictory demands can be challenging to be met by organizations. Innovating new and unique value often requires a different set of skill and environment (Reflective, creative process with the need for a reasonable time to experiment) than those needed for delivering rapid projects (Time intensive and process-driven activity). This state of complexity is the main reason for the research study that is discussed in this doctorate thesis.

Paradigm belief theory (Guba & Lincoln, 1994) and constructivism discipline were guiding this research work, assuming that there isn't just one-way of the truth as it is relative and highly dependent to its context, opening the concept for interpretations.

We used a blend of qualitative (Semi-structured Interviews, literature reviews) and quantitative (Multi-country and sector Survey) approaches in this research to increase the rigour of its findings, each methodology used works to complement and not compete with the other methods, in a way that it should help address some of the gaps and weaknesses, which can be found in each method if used independently.

The consequence of using rigorous mixed qualitative and quantitative methods allowed for the findings of this research to be published (3 articles) in scientific double—blind reviewed international journals and conferences.

A proposed conceptual framework to merge between some of the innovation and the project phases and activities, referred to here as “Pro-Innova” for short. We argue, validate and propose this new theoretical model that integrates the innovation and project management activities, using some aspects of the design thinking and the system dynamics loops with focus on the complementary and common aspects found in both areas to address the challenges, limitations and contradictions as well as the complexity each area (Innovation and Project) has on its own.

Furthermore, the research reveals a new practical management system to breakdown the Pro-Innova conceptual model into more details (process, organization, roles and systems) to help the interaction between new product & project development. The management framework is therefore referred to as “Prod-Ject” for short.

The proposed model (Pro-Innova) and while it has practical implications (Prod—Ject) and can be deployed within organizations in the public, private or social sectors, the model by analysis and design clearly follows the research perspectives that are more geared toward development in project management (Success, Business, Human, Contingency), which in one hand serves the research scope in the innovation project area. However, it doesn’t look at the other type of project perspectives that are merely focused on production (Optimization & Modelling).

Pro-Innova conceptual model branches into Prod-Ject practical management system that offers project owners at the PMO unit a new way of conceptualizing and managing their projects when aiming at producing innovative products and solutions. It also provides inventors at the R&D or New Product Development units a new way of conceptualizing and managing their innovation cycle. Therefore, the model offers modern organizations an end-to-end conceptual model combined with a practical management system, which enables ideas to be actualized with high impact, in an effective and efficient manner.

The integration of “Impact” in the Pro-Innova model and as part of the phases of the Prod-Ject management system is specifically aimed at forcing organizations to rethink the way they conduct their innovation projects, by moving from the short-term deliverable of outcomes into a longer term and sustainable socio-economic benefits. Therefore, redefining the success criteria for these exploratory organizational missions.

Academically, there are limited attempts in studying the relationship between innovations and projects, which allowed for this research to unleash new theoretical and conceptual angles.

Professionally, the two areas are often separated in a silo within organizations, putting modern leaders in a real paradox by either focusing their resources on one area (Creating innovative value) or the over (Delivering projects). The practical management system therefore attempts to bridge this gap and align internal organizational efforts for higher socioeconomic impact.

GENERAL INTRODUCTION

Several researchers argued for the perspective that project management should focus on processes, modelling, and optimizations to perform control and contribute to standardization (Turner, Huemann, Anbari, & Bredillet, 2010). This could be attributed to the influence project management had when it first started as a branch from operation research theories and therefore had some historical links to some early nineteen (1911) management science concepts during the Taylorism era which suggested human work as close as possible to machines in the factory. Looking at the project activities through the lenses of pure processes is a way to coordinate work across functions. However it increasingly hinders the quest for innovation and risks the adaptability factor that is key aspects in new management to deal with complexity and unpredictable operating environments (Rayasam, Renuka, 2008).

The definition of what is to be considered a project seems to have been widely accepted across most industry sectors and around the world, making it easier to define and process. However, the challenge with projects nowadays is that many are often failing to deliver on what all involved stakeholders would consider as a “successful result”, which goes beyond the traditional project definition that pay attention to the processes related to project cost, time and scope. And on the other hand, the reasons behind the failure of many projects around the world despite the clarity in processes and definition in scope, cost and timelines (Economist Intelligence Unit, 2009).

On the other spectrum innovation, the creation of something both novel and helpful that can be a new product, service, process, model, or a new way of organizing. Whatever form innovation takes, people often think of it as a chance occurrence, a brainstorm by one of those rare individuals who is creative, but the actual process of innovation is more complex. (Hill, Brandeau, Truelove, Lineback, 2014). Innovation attracted more research attention compared to the project management area. The focus however was majorly in the technological innovation area (Brady & Hobday, 2012).

A major challenge with innovation in today's global environment remains somehow consistent with those discussed by some fathers of innovation research such as the case of Schumpeter who argued that the prediction of business cycles and the success of business model rely heavily on the model ability to predict future cycles after careful consideration of historical events and trends (Schumpeter, 1939). Similarly, Friedman argued that the solidity and reliability of a model is assessed based on its predictability factor more than its assumption. He also distinguished between new and improved innovation (Friedman, 1953). The Schumpeterian innovation emphasized the point that innovation is not just about technology, as it includes other things such as imagining new combinations of the firm resources and capabilities (Galunic & Rodan, 1996).

And while innovation models started to evolve through different generations (Rothwell, 1992), unlike projects that achieved a certain level of clarity in definition and process flow, innovation lacks a clear definition and way to conceptualize, which is a major case for why many great ideas don't see the light of becoming a real product or service (Chunka Mui, 2012).

And therefore, as we analyze and look closely at the innovation trends, benefits and challenges and those for the projects, we started to detect contradictions, but also similarities and complementarities all at the same time, which lead us to further explore the interaction and relationship between the two areas in an attempt to contribute in solving the complexity faced by modern companies.

On the complementary traits, what innovation is missing in term of clarity in definition and process is what projects seem to excel with some clear and widely consented definition and agreed processes that the innovation area is still searching for.

Looking at the similarities, it seems that today's modern organizations are trying to use both innovation labs, R&D centres as well as the project and program offices to break from the traditional organizational structures with the hope to come up with a final deliverable that is new, unique and different.

On the other hand, no one can ignore the fact that organizations today are still perplexed to put the words innovation and project in the same sentence. Innovation is often perceived within organizations as the free flow, unstructured and borderless work that requires the genius of the people involved to produce the next big idea, while the project term is still commonly perceived to a very structured and defined scope and processes that doesn't tolerate deviations and regularly rejects creativity that is considered "out-of-scope". Still, the real unanswered questions are why many innovation initiatives don't see the light (market: customers, users or citizens)? And why several important projects' work fails? Despite the defined processes and scopes.

Looking at it the other way around, what makes innovation work? And what makes the project successful? Could organizations and governments benefit from the structure of the projects to make great ideas a reality? And can the inspiration behind a great idea define and drive projects' success? It was worth exploring!

We also recognize that organizations are generally dense with several internal and external interdependencies, objectives and goals. Within this organizational density, innovation and projects are arguably the most complex work an organization undertakes with the human factor at its highest, connected processes and networked organizational structures. Therefore, exploring a relationship between these two complex undertakings will require applying simplification through an effective use of design thinking and dynamic systems to try and explain any relationship through the feedback loops and interactions.

Although it's a challenging objective to advance this area, it can be seen as a potential unique angle to further examine the relationship and links between innovation cycles and project management. The integration between project management and innovation research is very limited, opening the door for more research work to be done to examine a stronger link between the two areas (Brady & Hobday, 2012). The main objective of this article is rethinking the traditional project management concepts by conceptualizing a new theoretical model, which brings the discipline of project management closer to the field of innovation. We argue that project is a critical enabler for the creativity to materialize and for the innovation cycle to get completed.

CHAPTER 1

RESEARCH CONTEXT & REVIEW

Complexity is a living Challenge to innovate while delivering results with impact. At the macro and micro levels, governments, industries, and organizations are constantly challenged by their leaders, stakeholders, users and customers to show relevance by adding value with new services, products, and solutions. At the same time, the same stakeholders are very demanding for the agile delivery of these results with high quality (Rosenbusch, Brinckmann & Bausch, 2011). Both competing and often contradictory demands can be challenging to be met by organizations, since creating new and unique value often requires a different set of skills environment (Reflective, creative process with the need for reasonable time to experiment) that those needed for delivering rapid results (Time intensive and process-driven activity).

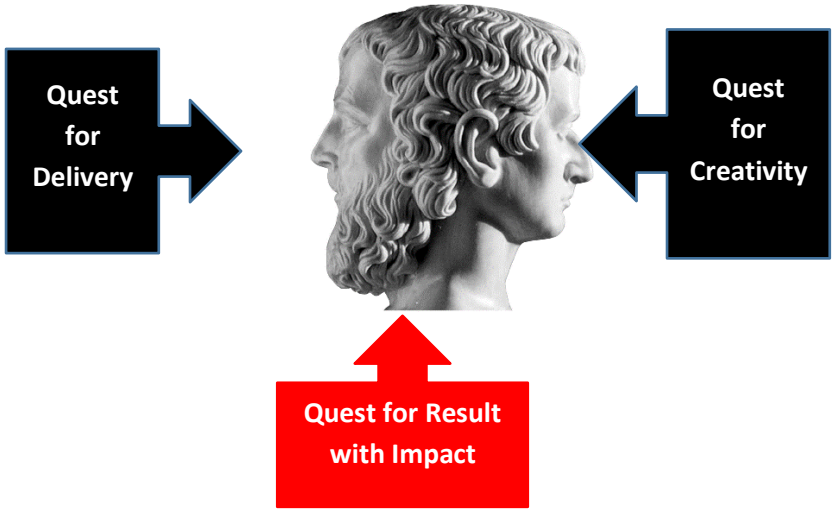


Figure 1: Organizational Paradox

Source: Researcher's illustration

With this complexity, companies, industries, and governments often decide to focus on only one side of the two spectrums, as an example, the delivery of rapid results (products or services) on timely and agile fashion while ignoring the continuous need to create new and unique value to their stakeholders, and the other way around would also apply as shown in (Figure 1).

This situation is often the reason why many firms struggle to sustain its activities for the long-term. Industries start to struggle and get merged into other advanced sectors. And government falls into an economic downturn (Rodrik, 2016).

This state of complexity caused by the contradictory nature of the two increasingly stakeholder-demanded areas, one (Innovation) that is intangible, hidden and dependent on the organizational ability to realize new value through the brainpower and organizational intellectual capital (Edvinsson, L. and Malone, 1997), and another (Project delivery) that is often tangible, scope-defined and can be realized through established processes (PMI, 2004).

This human factor, skill requirements (IQ and EQ) that at times contradict each other, yet are required to interact with the two demanded areas (Innovation and project delivery), and how the two areas' process areas could be potentially interlinked inside the same organization with the objective and interaction to satisfy the external stakeholders, are the premier reasons and trigger for this research to be conducted with the quest to come up with a potential theoretically-tested and practically-practiced adaptive model to assist organizations, industries, and government in meeting the increasing stakeholder demand for

creating new value (Innovation), while delivering results (Projects) that sustainably benefit the economy and social levels (Impact), as seen in (Figure 2).

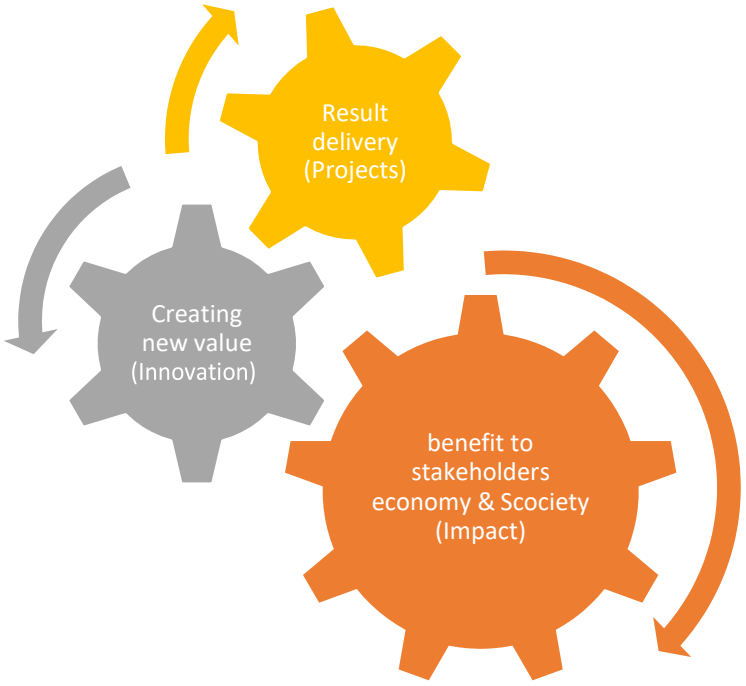


Figure 2: Organizational Complexity

Source: Researcher's illustration

1.1 Innovation-dilemma:

Innovation is becoming a "buzz" word that is being transmitted to organizations and governments around the world whether they are small, medium or large-sized. Fortune 100 companies invest and dedicate billions of dollars from their earning toward research and development that are primarily aimed to give them a competitive edge against their market rivals. Apple, Microsoft, Google, and Samsung spend a combined US$32 billion in research

and development R&D (CNN Money, 2013). This R&D is being considered as an important innovation activity, which often translates into new products, processes or markets (Oslo Manual, 2005). The world's biggest R&D spenders are also responsible for around one third of all the patents filed in the US and EU patent offices. Consequentially, these R&D and innovation investments have a direct impact on the firms and governments overall growth and profitability as per the latest EU industrial innovation performance that uses R&D investment as the key indicator for innovation in at both the private and government sectors (Guevara et al., 2015).

At the firm level, we notice that the R&D and innovation investment made by major firms mounted up to EUR 89.1 billion in 2015 did surpass in many governments total budgets, especially in developing and emerging economies, which speaks to the value and relevance innovation plays in modern organizations, being a major factor in its longevity and sustainability over the various time horizons. This investment in innovation is also contributing to these firms' revenue and profitability as indicated in the last Fortune 500 analysis where all major R&D investors were in the list that measured their revenue and profitability (Figure 3).

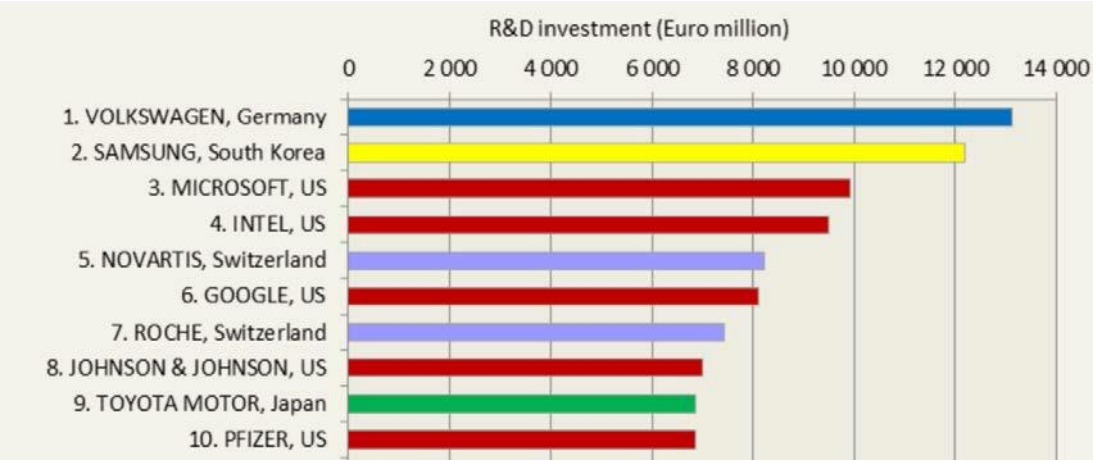


Figure 3: The World's Top 50 Companies by their total R&D Investment (€m) in the 2015
Source: EU Industrial R&D Investment Scoreboard, 2015, p.38

At the macro country level, major competing world economies such as the US, EU, China and Japan are ensuring they have the lion share of R&D investment by their home-based companies, as shown in (Figure 4).

Figure 4: Top R&D Investing Companies by Country

Source: 2015 EU Industrial R&D Investment Scoreboard, 2015, p.19

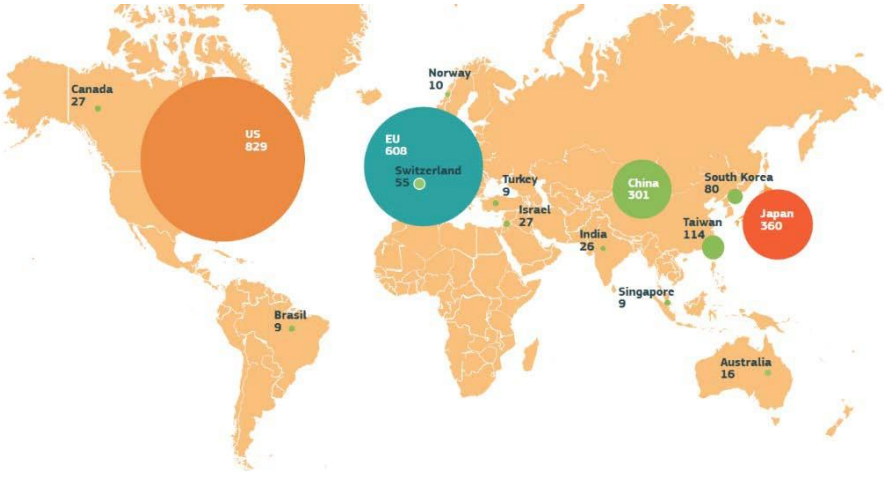


Figure 5: R&D Investment and Net Sales

Source: 2015 EU Industrial R&D Investment Scoreboard, 2015, p.28

In particular, that many governments have realized the interrelation between macro and micro levels illustrated in the below relationship between R&D investment and Net Sales trends, and their overall impact on employment and socio-economic sustainability.

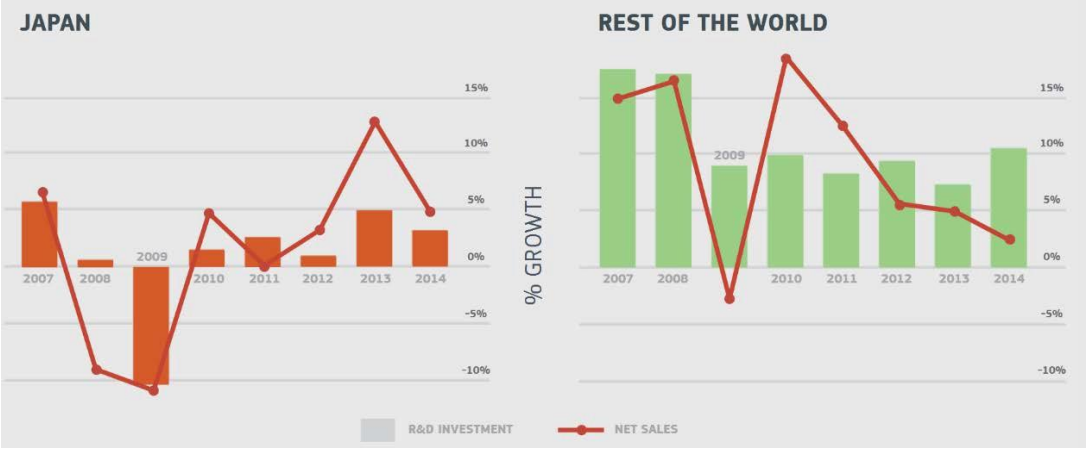


Figure 6: EU Industrial R&D Investment Scoreboard, 2015

Source: 2015 EU Industrial R&D Investment Scoreboard, 2015, p.28

At the industry and sector levels, the deviation and difference between industries with regard to their investment in R&D and innovation is also quite noticeable, giving us an idea that not all industries have the same attention and intensity to innovation. The gap in investments in firms working in transportation and public

service sectors compared with pharmaceutical or information technology services is remarkable, as seen in (Figure 7).

Figure 7: R&D Investment by Sector (2006 vs. 2014)
Source: EU Industrial R&D Investment Scoreboard, 2015, p.13

The lack of R&D investment has certainly impacted the economic profitability and attractiveness of certain sectors and firms within. In a McKinsey Quarterly review analyzing the economic-profit performance of nearly 3,000 global companies from the different industries (Bradley, Dawson, & Smit, 2013). Pharmaceuticals and IT industries that were highly ranked in their share of R&D project investment, as shown in (Figure 8), (Guevara et al., 2015), these were also listed among the top 5 industries in term of economic-profit performance (Bradley et al., 2013), while those who didn't appear to invest in R&D projects are categorized among the bottom five industries, including airlines and railroads in transportation, in economic-profit performance.

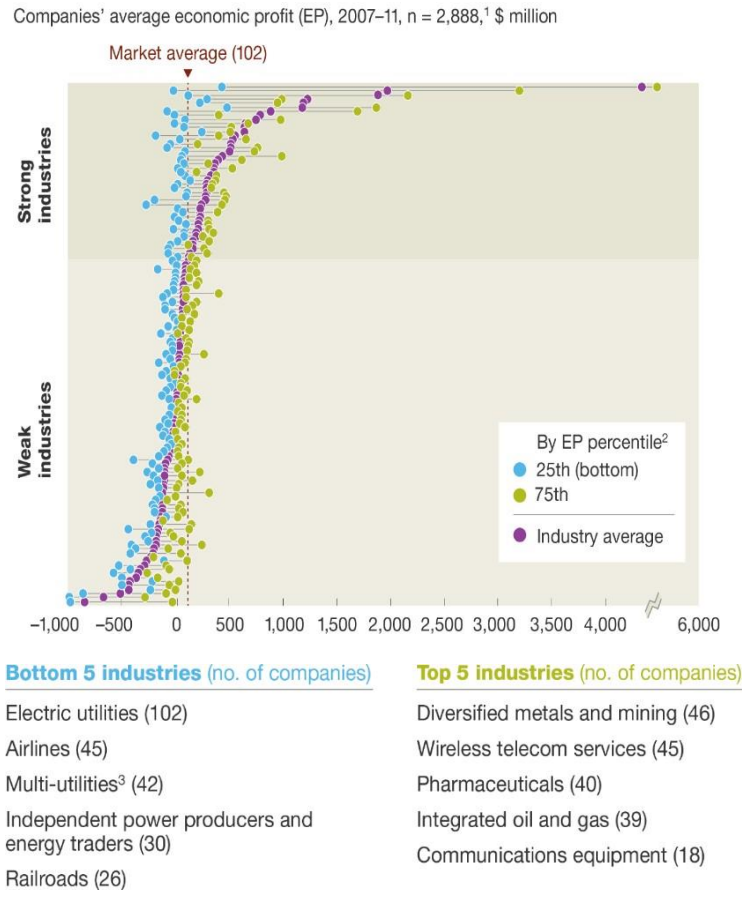


Figure 8: Distribution of company economic profi t within industry

Source: McKinsey & Company, 2013, p.32

Consequently, the principle of "being creative and innovative" has also been integrated within many organizations' corporates core values, missions and visions' statements, which are used to drive new strategies, plan resources, and even screen new hires as well as assess employees' performances. Some of the world biggest R&D investors, Volkswagen, has in its mission a specific goal to set the world standards in their respective vehicle class. Samsung's vision for the new decade is to "inspire the world and create the future" with a key focus on "New Technology," "Innovative Products," and "Creative Solutions."

Organizationally, CEOs and senior leaders are busy creating new units to foster innovation within the company to come up with the next “big thing” of product and services that will define their value proposition and competitive advantage within their respective industries. And therefore, we see many Innovation Labs, Think-Tanks, Innovation Awards, R&D centres that are all being created to be led by the highly skilled human resource in order to manage these complex brainstorming and creative-processing activities. In many cases, and to illustrate how strategically important innovation is for companies, these innovation labs, and R&D units are moved outside the corporate borders as stand-alone subsidiaries with the goal to break from the traditional (often operational) organizational activities.

The Roche Innovation Center in Copenhagen was set up outside the main company offices in Switzerland, as an independent subsidiary company, focuses on the discovery and development of targeted therapies internationally and offers targeted drug to enter human clinical trials. The firm attention to R&D and innovation has a direct influence as well as get influenced by the country and government level of focus in this area. No wonder most of the fortune-500 companies and the leading innovators within their sectors are based in countries with advanced economies that dedicate important portions from their GDP to spend on research and development, with the goal to foster and sustain innovation-based economies with new jobs and employment opportunities (Figures 9, 10 & 11) according to the new 2016 academic-industry research by Johnson Cornell University, INSEAD Business School, and the World Intellectual Property Organization (WIPO)—The Global innovation Index (Dutta, Gurry, & Lanvin, 2016).

Country/Economy	Score (0–100)	Rank	Income
Switzerland	66.28	1	HI
Sweden	63.57	2	HI
United Kingdom	61.93	3	HI
United States of America	61.40	4	HI
Finland	59.90	5	HI
Singapore	59.16	6	HI
Ireland	59.03	7	HI
Denmark	58.45	8	HI
Netherlands	58.29	9	HI
Germany	57.94	10	HI

Figure 9: The Global Innovation Index, 2016
Source: Johnson Cornell University, INSEAD Business School, and the World Intellectual Property Organization (WIPO), 2016, p. 20

Those governments, industries, and firms operating within an innovation supported ecosystem have paid attention to some key enablers as illustrated below.

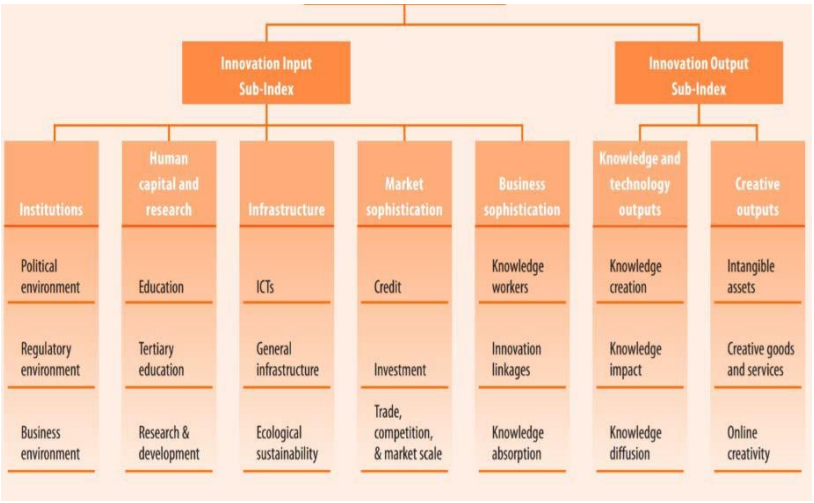


Figure 10: Innovation Ecosystem & Framework
Source: Johnson Cornell University, INSEAD Business School, and the World Intellectual Property Organization (WIPO), 2016, p.50

It is countries who have the most efficient and effective innovation ecosystem (High GII Score) have a leadership economic position (GDP) globally as the study concluded, this is shown in (Figure 11).

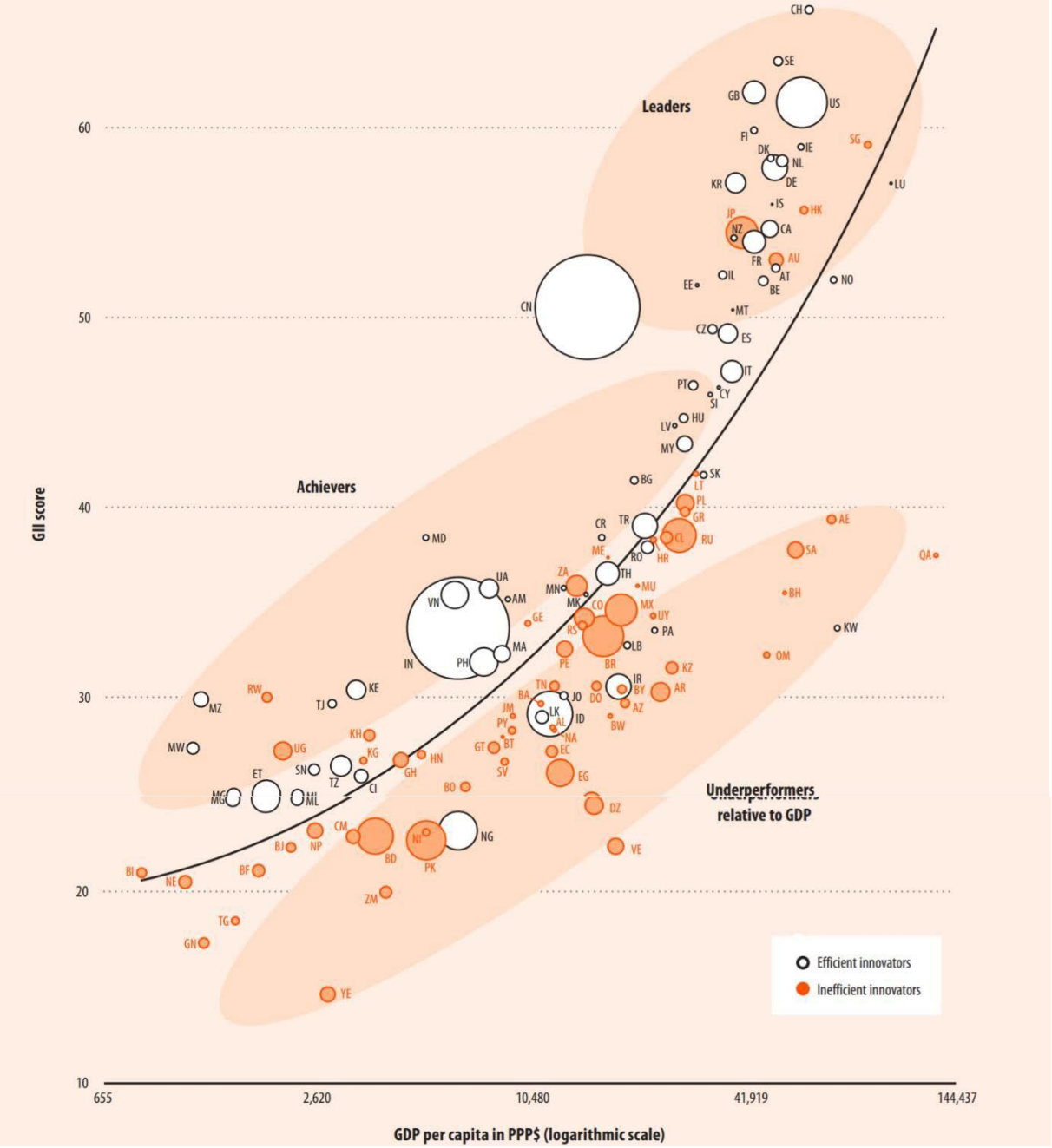


Figure 11: The Global Innovation Efficiency & Economic Performance
Source: Johnson Cornell University, INSEAD Business School, and the World Intellectual Property Organization (WIPO), 2016, p.32

In addition to the company and country levels, we can further illustrate the importance of innovation to improving performance at an industry level, the air transport industry (The air carriers) as an example, has one of the lowest R&D investment among all other industries as studied by Mckinsey for IATA in the profitability and the air transport value chain (The ecosystem that forms the industry) report (Pearce, 2013).

The state of this industry, in particular, that's not enjoying the best economic conditions (ROIC, and economic performance), neither that it invests in the R&D projects, i.e. 67 companies from this industry invested less in R&D projects than 4 IT companies (Guevara et al., 2015).

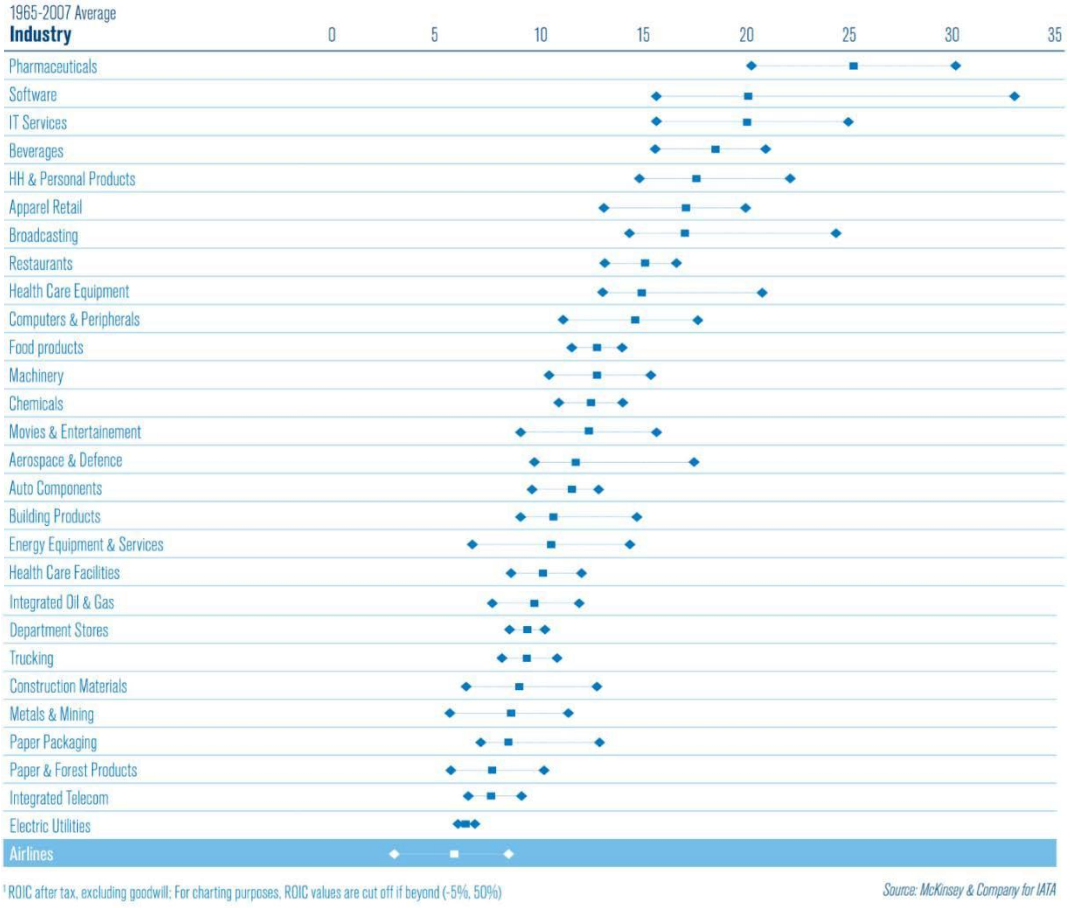


Figure 12: Industry Median ROIC
Source: Mckinsey for IATA, 2013, p.12

Many of the critical industry value chain players such as airlines and airports don't even exist in the R&D investment space. This lack of investment in innovation has certainly impacted the economic profitability and attractiveness of the aviation sector in general, especially for its main players such as the airlines.

In the same token, we could zoom even further to the air transport value chain, and we will find that airlines who invest very little (if any) in R&D have one of the lowest Return on Invested Capital (ROIC) with about 4.1% by 2011, this can be shown in (Figures 12), compared with other aviation industry value chain players such as the technology and reservation system providers and manufacturers, which invest in R&D projects and has higher ROIC than airlines.

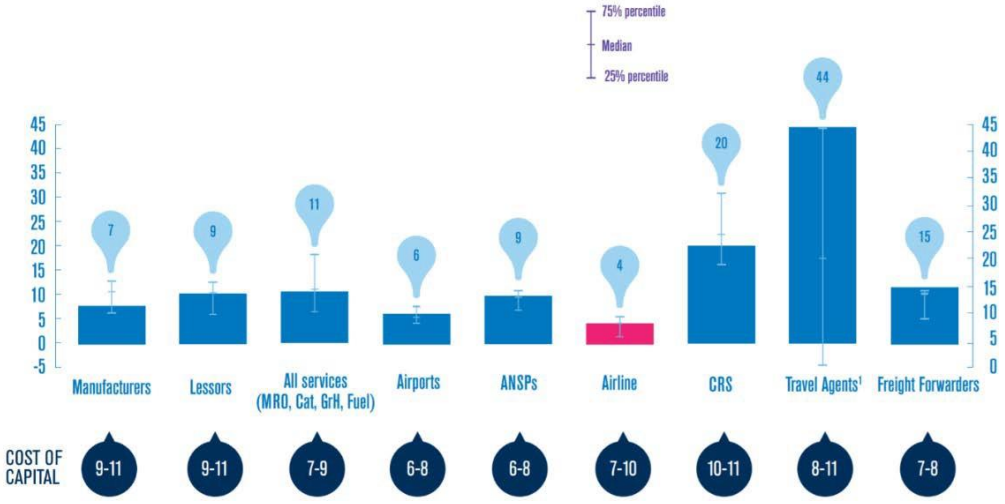


Figure 13: Return on Capital throughout the Value-Chain

Source: Mckinsey for IATA, 2013, p.19

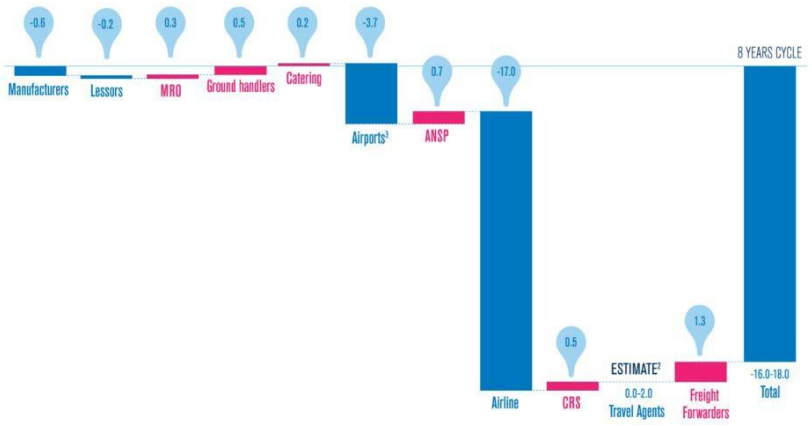


Figure 14: Economic Profits in the Air Transport Value-Chain
Source: Mckinsey for IATA, 2013, p.21

With all the above-mentioned about R&D and its link to the country, industry and company economic performance, and considering the remarkable variation in R&D and innovation investment among the different firms (Apple vs. Air Canada), industries (Pharmaceutical vs. Air Transport) and regions of the world (North America vs. Africa).

Academically speaking, and as outlined in my literature review during the exam presentation, as part of the economic view on projects is to evaluate the product development and innovation as well as the R&D cycles in businesses and their relation to projects and project management (Artto & Wikstrom, 2005). All three perspectives in this area (Success, Marketing & Governance) are relevant to this doctoral research topic.

To briefly introduce this area, it is important to remember that the simple concept of innovating something new is in a way linked to what projects are intended for, which is to create something unique. Both are linked to the basic idea of development (Morris, Pinto, & Jonas, 2012). Trying to figure out the effect of innovation on the general aspect of human

life, Gordon (2012) presented a graph in NBER Working Paper, where he expressed average annual GDP growth after a meaningfully innovated idea introduced to the society.

Table 1: Impact of Innovation to Economy

Period	Average GDP Growth Rate (%)	Introduced Innovation
1700–1850	0.4	WATT'S STEAM ENGINE STEAM LOCOMOTIVE TELEGRAPH
1850–1870	0.7	
1870–1910	0.8	ELECTRONIC GENERATORS INDOOR PLUMBING
1910–1940	0.9	BROAD CAST RADIO
1940–2010	1.9	

Source: Gordon, 2012

The clear effect of innovation is presented by an increase in the annual GDP growth as the gauge of overall economic activity. On the other side, if we look at the company level, the link between the project management and the innovation models has been looked by examining the first generation of innovation models (Technology push) when R&D is expected to come before new product development. This sequential process suggests in a

way the project management process as a part of the development lifecycle (Morris et al., 2012).

The link between the project management and the second & third innovation generation models maintained a presence with the integration of the market and customer feedback to the innovation project development process. However, the link between the two areas started to pick up again during the times of the fourth-generation innovation model when integration across the different functions (and the matrix management) started to require cross-team coordination and therefore project management was part of the solution to coordinate efficient delivery across the multiple functional streams.

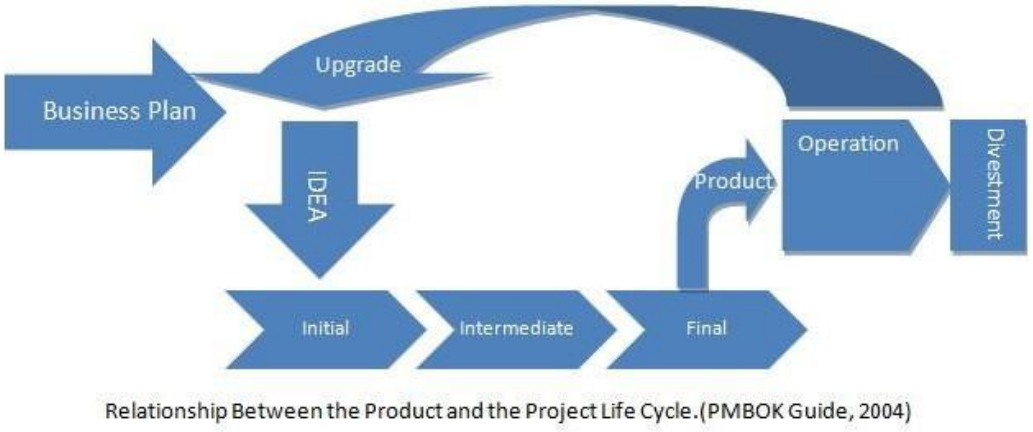


Figure 15: Relationship Between the Product and the Life Cycle.
Source: PMBOK Guide, 2004, p.24

Even though, it's going to be a challenging objective to advance this area, there is an argument about the relationship and links between the project and innovation management. The integration between project management and innovation research is very limited (Morris et al., 2012), opening the door for more research work to be done to examine a stronger link between the two areas.

By the same token, the innovation models themselves evolved through different generations (Rothwell, 1991), the latest of which is the fifth-generation systems integration and networking models post the 1990, opening yet another door to explore the possibility for a sixth and even seventh generation of innovation models that will further integrate the common attributes between innovation and project systems, i.e. the attention to creating unique solutions that come through coordination with the aim for development, while respecting their own specific features, one being open and the other is scoped and structured. Through the effective use of dynamic models to solve real complexities at the company, industry and country levels.

Table 2: Innovation Generations

Rothwell's Five Generations of Innovation Models	
Generation	**Key Feature**
First	Technology Push: Simple linear sequential process
Second	Need Pull: Simple linear sequential process
Third	Coupling Model: recognizing interaction between different elements and feedback loops between them
Fourth	Integrated Model: Integration within the firm, upstream with key suppliers and downstream with demanding and active customers, emphasis on linkage and alliances
Fifth	System integration and extensive networking model: Flexible and customized response, continuous innovation

Source: Rothwell, 1992

While the innovation in complex product systems (COPS) did explore some links between product development and projects in the high-technology industries, new research is required to understand the link between innovation and projects in other industries (Morris, Pinto, & Jonas, 2012). One example is the aviation industry (with a focus on airlines) where limited project and innovation related research was conducted in the past. Few and specific aeronautics projects related research were reviewed e.g., Whittle, 2004 and Scranton, 2006 on the Jet industry. It's also worth noting of the unique role the aviation industry plays in all industries by transporting goods for the IT, agricultural, pharmaceutical and other sectors, connecting businesses and people together, contributing to the countries and global economic health. Above all bridging cultures and promoting tourism worldwide. All is making the research in this particular industry worth doing for its own benefit as well as of the other industries benefiting from its services in today's connected global economy.

Similarly, very limited research work was given to explore innovation and project interaction in the standard development context, which uniquely crosses the different industries and sectors across the world and enables the smooth transfer and expansion of innovation and technologies across the countries and industries.

Innovation challenge

Organizations' challenge with innovation in today's global environment remains somehow consistent with those discussed by the fathers of innovations such as the case of

Schumpeter who argued that the prediction of business cycles and the success of business models rely heavily on the model ability to predict the future with careful consideration of historical events and trends (Schumpeter, 1939). Similarly, Friedman argued that the solidity and reliability of a model is assessed based on its predictability factor more than its realization (Friedman, 1953). The dynamic competitive market factors, which that Schumpeter argued foster innovation at a much more efficient rate than a perfect competition is what we are seeing in today's volatile and technologically provoked markets.

The same Schumpeter's creative destruction process (Schumpeter, 1942), which proposed that capitalism survives and strives from the new goods, new means of production, and from the quest for people to evolve in the way we communicate and transport, are the same we notice nowadays. The Schumpeterian innovation emphasized the point that innovation is not just about technology, as it includes other things such as imagining new combinations of the firm resources and capabilities (Galunic and Rodan, 1996). And therefore, the challenges we see in our modern days when it comes to innovation are best described in two folds.

The first is related to the definition of innovation (The output), as the word itself can in many cases be interrupted differently by different people, organizations, industries, and governments. In some companies and industries such as in IT and high-technology, innovation is often linked to revolutionary thinking and breakthrough ideas, whilst in other companies and industries such as in the transportation sector, innovation could be as simple as a new product development that in cases were transmitted from another sector or

geographical region, which are generally of an evolutionary nature. Take the example of innovation considered by airlines to track the passengers' luggage using RFID technology, which was previously introduced in other industries such as in the food supply chain and retail industry.

The second fold to the innovation challenge is related to its process and cycle (The input), many companies considers innovation a brainstorming exercise that is done internally (and occasionally with external stakeholders) to come up with an idea to either breakthrough or improve from where they stand today. These ideas often existed somewhere else in the world but aren't evenly distributed, and usually remain at the innovation lab or the R&D centre levels, failing to make it to reality including to markets and the hands of consumers.

This is not to suggest that the only way to foster innovation at the company, industry and country levels is by just spending resources in research and development. There are many examples of organizations that allocated major resources to R&D and yet failed to innovate and create a real breakthrough. However, R&D as we have seen in the several analyses, it remains today as the key indicator for the country, industry and firm level of innovation.

And the famous case of Kodak's in the digital photography industry is one that can vividly be used to illustrate how the company R&D by itself only can't create the innovation that impact markets and economies. The company that originally invented the digital photography within their sophisticated R&D labs, missed a great market opportunity when

they delayed its launch to market for decades, as a result of their lack of agile execution and fear from losing their status quo leading market position in the traditional film business (Chunka Mui, 2012).

On the other hand, learning from how a company like Sony grabbed an opportunity to take over the global digital photography market share from Kodak. This wasn't because of Kodak's insufficient investment in R&D or lack of innovative thinking since Steve Sasson, Kodak engineer, was actually the inventor of the first digital camera back in 1975. This could be attributed to Kodak strategic failure to try and take the idea from the R&D lab to market in an agile implementation manner.

The above multifold innovation challenge, at both the input and output levels, poses questions on what exactly is considered innovation and what is the process that firms, industries, and countries can use to define and deliver on innovation. And with all existing innovation definitions and processes being considered, the question this research will attempt to answer what else we can bring to clarify the concept of innovation and accelerate its processes.

1.2 Project on-time

In accordance with the Project Management Institute research in 2013 that conducted in collaboration with the Economist Intelligence Unit, there are about fifty-one million people who are involved in projects worldwide. The use of projects in organizations is considered nowadays a necessity and arguably has a greater importance and utility,

especially within SMEs, than the use of innovation that can be at times limited to high—performing and big companies in matured-industries often within advanced economies.

Projects are often linked to the organization ability to deliver on important strategic initiatives, and on customer needs. Take the example of the car and aircraft manufacturing activity where project management is used as the key tool to deliver new products as per the customers' requirements. Many corporates values, vision, and missions are also highly linked to the company ability to deliver its results with agility.

Organizationally, project and program management offices (PMOs) are being created in many companies with the objective to create a culture of delivery and discipline within their DNA. This has a great impact on organizations' performance since it is considered that companies with strong project performance, which are delivering more than eighty percent of the schedule, budget and scope, achieve as twice as many strategic initiatives (Figure 16) than companies with the weak project (PMI, 2014).

Figure 16: Strategic Initiatives & High Performing Organizations
Source: Project Management Institute, 2014, p.9

And you can see this live in major international companies such as HP that has a prime strategic goal to be the preferred outsourced provider for companies, and with that in mind, the company structures itself to set up a dedicated PMO for each acquired account to better serve the customer needs in a consistent and efficient manner across the world.

This discipline in delivering results was also confirmed when an Economist Intelligence study revealed that about eighty percent of the participating global leaders confirmed that having project management core competency assisted them to maintain competitiveness, especially during the economic downturn (Economist Intelligence Unit, 2009). Equally speaking, a survey study by McKinsey & Co. explained that about sixty percent of executives mentioned that establishing a solid project management discipline is among their top three priorities in the future. In Intel, the global IT giant "Good project management discipline stopped us from spending money on projects that fail," said Ron Kasabian, general manager at Folsom, California.

At the government levels, some regulators realized the importance of project management to the effectiveness of their economies. Take the European Union (EU), which made a regulation that requires a strong project management methods and skills as selection criteria for EU funds in building any member country administrative capacity. This helps governments implement projects effectively and efficiently when receiving the EU financial grants.

And like in R&D and Innovation, there are industries that are more project-intensive (Figure 17) where employment has more and high-level project related work than others as studied in the last industry growth forecast 2010–2020 (PMI, 2013). Many these industries are also enjoying a very good economic performance in revenues and margins (Bradley et al., 2013)

Figure 17: Project Intensive industries
Source: Industry growth forecast 2010–2020 PMI, 2013, p.2

At the country level, advanced economic countries and some emerging economies seem to have an established or quickly developing project management industry, measured through the forecasted job demand for the project management roles by the year 2020, as shown in (Figure 18).

Figure 18: countries with Project-Intensive Industries
Source: Industry growth forecast 2010–2020 PMI, 2013, p.3

This global project management intensive demand of about 15.7 million new PM roles between the years 2010–2020 will have some expected direct impact on both the country economic performance as well as the specific project-intensive industry levels, which was estimated by $18 trillion in economic activities.

Project Management has also expanded beyond the important economic benefits and is helping in the sustainable development of countries, especially developing countries, around the world. The United Nations Office for Project Services (UNOPS) looks after more than one thousand humanitarian, peacebuilding and developmental projects in some of the world's most challenging environment within eighty developing countries around the world (Figure 19), managing a budget of about one billion US dollars, with a very high level of effectiveness and efficiency. The UN believes that "better projects—those that are better designed, better implemented and better coordinated—improve the lives of people in need" (UNOPS, 2015).

Figure 19: UNOPS Active Projects Worldwide
Source: United Nations Office for Project Services (UNOPS), 2015

Project challenge

The Challenge with Projects, on the other hand, can be a bit contradictory to the ones noted in the innovation area. The definition of what is to be considered a project seems to have been widely accepted across all sectors and countries around the world, making it easier to define and process. However, the challenge with projects today is that many of them are often failing to deliver on what all involved stakeholders would consider as a "successful result".

Therefore, the challenge in projects seems to be **in one hand** defining what can be called successful by all stakeholders, which goes beyond the traditional project practises of cost, time and scope outputs, and, on the other hand, the reasons behind the failure of many projects around the world (and the success of the few) despite the clarity in scope, cost and timelines (Economist Intelligence Unit, 2009).

Several studies that analyzed projects' performance suggested that the majority of projects fail to deliver what their stakeholders want them to achieve, making the project failure a new norm within organizations nowadays. The Standish Group Chaos Report indicated a thirty-one percent as the rate of failure within projects (Oracle, 2011).

1.3 Research challenges: In-between innovations and projects

And as we were analyzing the innovation trends, benefits and challenges and those for the projects, we started to detect contradictions, but also similarities and complementarities all at the same time, which led us to believe it is worth exploring the

interaction and relationship between the two areas to attempt solving the complexity issue described in the first chapter of this research.

On the complementary traits, what innovation is missing in terms of clarity in definition and process is what projects seem to excel at, with some clear and widely consented definition and agreed processes that the innovation area is still searching for.

Looking at the similarities, it seems that today's modern organizations are trying to use both innovation labs, R&D centres as well as the project and program offices to break from the traditional organizational structures with the hope to come up with a final deliverable that is new, unique and different.

On the other hand, no one can ignore the fact that organizations today are still perplexed to put the words innovation and project in the same sentence. Innovation is often perceived within organizations as the free, unstructured and borderless work that requires the genius of the people involved to produce the next big idea, while the project term is commonly perceived to a very structured and defined scope and process that doesn't tolerate deviations and regularly rejects creativity that is considered "out-of-scope".

Still, the real unanswered questions are, why many innovation works don't see the light (market: customers, users or citizens)? Why several important projects fail? Despite the defined processes and scopes. Looking at it the other way around, what makes innovation work? And what makes the project successful? Could organizations and governments benefit

from the structure of the projects to make great ideas a reality? And can the inspiration behind a great idea define and drive projects' success? It is certainly worth exploring.

Nonetheless, let us first recognize that organizations are generally dense with several internal and external interdependencies, objectives and goals. Within this organizational density, innovation and projects are arguably the most complex work an organization undertakes with the human factor at its highest, connected processes and networked organizational structures. Therefore, exploring a relationship between these two complex undertakings will require applying simplification through an effective use of dynamic systems to try and explain any relationship through the feedback loops and interactions.

How Can This Research Contribute?

From the prior sections' review, the challenges across the different firms whether in one industry value chain or in several sectors, or even across the different countries is becoming more visible that is to fuel innovation while being still able to deliver results with the agility to respond to market needs proactively in a sustainable development manner (Social, environment, and economic impact). Hence, how this research work could help address this simultaneous innovation and project delivery challenges at the company, industry and country levels.

The central idea of this research is to study the relationship between innovation and project. The main question is the degree of connection between innovation and project. In the light of this, the study tries to approach the research question through the following

sequence; first, Propose and evaluate the possibility of a new theoretical and practical model to manage the interaction between innovation and project with their impact. Second, Evaluate the link between innovation & project management (From the process, roles, systems & organizational fronts). Third, Evaluate the possibility to create a new innovation projects' impact tool that considers the company, country, and industry from the socio-economic angle.

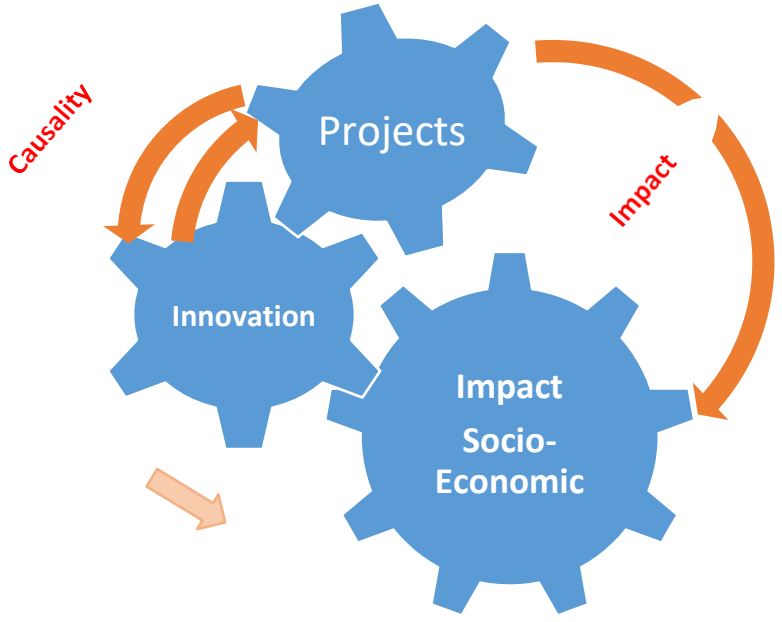


Figure 20: Interaction Between Projects, Innovation and Impact.
Source: Researcher's illustration

With this in mind, there is a possible unique angle to research about the concept of "Innovation Projects with Impact", which aims to build on and go beyond the current project management degree-one research categorized by Navarre (1989), as well as advancing the fifth-generation in innovation models described by Rothwell (1991/92/94)

by exploring the interrelation of the two areas. This work will also be benefiting from the research work that has been done in “business projects”, and “product development projects” (Artto & Wikstrom, 2005), by specifically researching the “innovation project” and their impact on the firm, industry, and country levels.

In order to ensure this research work is S.M.A.R.T (Specific, Measured, Achievable, Realistic and Time-bound) more emphasis was given to studying the interaction between innovation and project. While the impact was still reviewed, it took a second priority with regard to this research work.

The examination to a possible further interrelation and integration between the innovation and project management will lead this research to also review some practical aspects of management such as the organizational set-up in both areas by for example, evaluating how the Project Management Office (PMO) could potentially play a role in the R&D and/or New Product Development (NPD) organizational structure within a firm, industry, or country. It will also assess the new roles, integrated system, and process in both areas in a comprehensive ideation-to-realization cycle, which can be shown in (Figure 21).

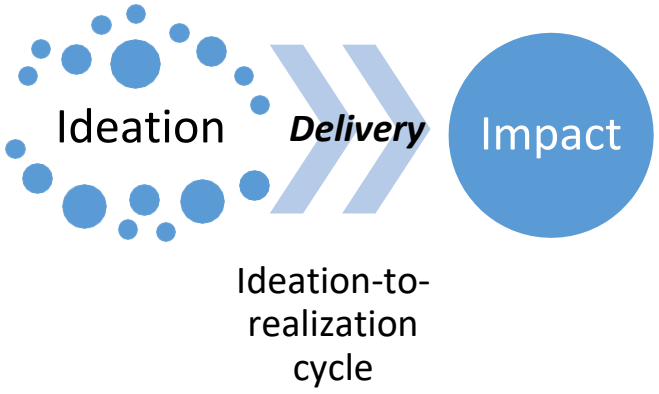


Figure 21: Ideation, Deliver and Impact Cycle
Source: Researcher’s illustration

The research and final outcome will give prime focus to the following audiences within firms, industries, and countries. First, less-mature economic countries, such as emerging and developing countries as defined by the United Nations and the Organization for Economic Co-operation and Development (OECED, 2016). Second, Low-medium R&D and project intensity industries such as transportation and services as categorized by the European Union and the Project Management Institute respectively. Third, Small and medium enterprises (SMEs) as defined by the World Trade Organization & United Nations Conference on Trade and Development (ITC, 2015) as opposed to mega organizations.

1.4 Literature Review

A review of some major literature in management, project, and innovation with their impact and integration in order to a) build from what has been researched, b) integrate some of the existing work for new area of work and c) focus on unique angles that has not been thoroughly explored in the past.

Evolution of Management

The concept of management as an activity to coordinating people and resources with the objective to achieve the desired results is a discipline that existed as long as human beings lived to survive through the different prehistoric as well as modern days. The evolution of the concept (The way we manage and organize) has indeed evolved together with the people

and civilization normal evolution including the introduction and use of new resources, tools and equipment to facilitate achieving results.

The Early Beginnings

Therefore, it is important we review the evolution of management concepts to help determine any pattern, or combined pre-existing models, which could solve the current and future management challenges. When doing this, it is worth highlighting the history of management doesn't necessarily evolve in a consistent linear manner, each period of time has complex and dynamic interaction that cannot be completely separated and distinguished as part of a specific and isolated periodic of time, and therefore the periodic classification used in this paper are used just to simplify the review process, by determining when a concept was first developed and used regularly without necessarily ending that management concept by the start of the next one. This is done in an attempt to facilitate the discovery of some useful characteristics, which could advance our modern management thinking, in a way it proactively solves current and future organizational challenges.

Historically speaking, and although the term widely known today as "management" is being directly linked to the modern era (Industrialization), it is difficult to deny the fact ancient civilizations that existed prior to the modern era, such as the Egyptian, Indian, Chinese and Sumerian age-old societies had used different forms of management to facilitate trade, construction or in organizing war campaigns. It is true however that the techniques, tools and work relationship including workforce compensation and motivation, which were mainly described as top-down and authoritarian, had been completely different

back then to what researchers and practitioners would describe management in the modern era.

From the 5th to the 15th century is when the world started to slowly witness some advancement in the use of new management tools with thanks primarily to the introduction of the Hindu-Arabic numerals (Smith and Karpinski, 1911) which led to the evolution of double-entry book-keeping in the 13 and 14 centuries by the merchants of Venice, transforming the way enterprise conducted and controlled its business activities.

In the 18th and 19th centuries during when the industrial revolution began with factory management concepts that were mostly inspired by military practices (Giddens, 1981). The industrial (factory management) revolution had prompted key economists and theory thinkers such as Adam Smith and John Stuart Mill (who lived in the 17-18th century) to contribute in providing ideas on management issues such as factory production, resourcing and market value (Pricing). At the same time, others like James Watt, Matthew Boulton and Eli Whitney focused on specific elements related to the factory production activities including processes, quality and planning procedures. While the role of a compensated managerial position came into the management surface by the late 19th century (Khurana, 2010).

The 20th century brought some important innovation into management discipline. This included the introduction of the scientific principles into the traditional management theories. Some pioneers in this area consist of some early writing by researchers such as

Henry R. Towne's in the late eightieth century (1890s) with the introduction of the Science of Management, Taylor titled as the father of scientific management with his influential monograph the Principles of Scientific Management in the 1911, widely known in management as the Taylorism, it outlined four important principles that led the development of modern management era. Firstly, replace traditional work methods with methods based on a scientific study of the tasks. Secondly, scientifically search, select, train, and develop each employee instead of leaving them to train themselves. Thirdly, give clear, and specific instruction and supervision of worker in the performance. Fourthly, split work fairly between managers and workers, for managers to apply scientific management principles to planning the work performed by workers who perform the assigned tasks.

And some other fathers and pioneers including Henry L. Gantt and his famous charts (1910s) that is still used today in almost all project management discipline (Morris, 1994). Following the 1910s decade, the principles of scientific management (Taylorism) started to transfer across the Pacific Ocean from the US where it originally started to Japan which was at an important industrial growth time, Yoichi Ueno called as the father of Japanese administrative science was among the first who led this transfer of knowledge to Japan as well as introducing the Japanese management concepts to the US and the rest of the world. As an example, it was the Ueno's family (Ichiro) who had the important role in the Japanese quality management and assurance concepts (Wood, 2002).

A more coherent and comprehensive management concepts started to appear in the 1920, and a year from then was when Harvard University offered a first MBA program. Henry

Fayol also a founder of modern management methods introduced the theory for general administration known as Fayolism (Witzel, 2003) which for the first time proposed fourteen principles and five main functions of management that firms are still using till our modern days. Those were the planning, organize, staffing, directing, coordinating and controlling. The Fayolism principles and functions were detailed in his publication "Administration industrielle et générale; prévoyance, organisation, commandement, coordination, contrôle" (Fayol, 1917).

Beside the famous Taylorism and Fayolism phenomena that came in the early 20th century to transform research and management concepts from basic common sense into more scientifically-oriented work, furthermore, there were some other pioneer researchers who came after to argue and apply the principles of psychology into management practices (i.e. the Art beside the Science in management). Those included Walter Dill Scott who was among the first psychologists who applied the psychology principles into the different management practices, including researching the subject of human motivation and required intelligences at the work place that were covered in some of his work as in the "Increasing Human Efficiency in Business—A contribution to the psychology of business" in 1911.

During the second half of the twentieth century, major researchers such as the founder of modern management in corporation Drucker who also greatly contributed to the development of management education, and the introduction of modern concepts described in the "Concept of the Corporation" publication in 1946 and many other modern management books that were majorly influenced by the automobile industry (Alfred Sloan

of General Motors). His work comprised modern concepts such as the management by objective (MBO) still being used by companies today for staff performance management and appraisals (Sloan,1990).

In the same time, the management science, (not to be confused with the Taylorism and scientific management), included operations research using statistical and quantitative approaches to solve management problems (Such as in transportation, IT and quality) were also explored by researchers like Patrick Blackett, Thornton Fry and Ronald Fisher to name a few.

The combination of the above-mentioned researches on management theories during the 20th century lead to the belief that management is a combined scientific and artistic discipline with a blend of the two areas, which require a careful increase of the science than the art in specific management situations and vice-versa. For example, the area of management in human resources requires more of the art (i.e. understanding staff psychology and motivation) than the science. While areas such as financial, IT and operation management require the scientific part (i.e. mathematical and statistical approaches that are fact based) more than the artistic part. Other management areas such as strategy and marketing may require equal proportion of the art and science of management, i.e. data analysis with market intelligence (Consumer insights, competition and market trends) in understanding the customers' behavior and needs in order to make better strategic decisions on existing new products and services.

Modern Management Theories

The 21st century saw major development in the area of technology, which in turn forced many companies to re-think the way they manage their resources (Financial, material and human resources) to effectively and efficiently operate their businesses. This era saw the introduction of the e-commerce business models. Traditional business such as the travel companies that used to operate through traditional retail shops, hiring staff to manage daily face-to-face interaction with visiting customers, the printing and distribution of airlines' paper travel tickets and holiday packages are now mostly e-businesses (e.g. book.com, TripAdvisor etc.), which require less overhead and physical presence and more virtual customer service solutions. All this transformation happened rapidly thanks to the introduction of the e-ticketing and other technologically oriented distribution concepts.

Other examples exist in several other industries such as in the case of consumer shopping that is smoothly transition into new e-commerce platforms (e.g. eBay, amazon.com.etc) to replace traditionally-run shopping malls and retails that require heavy inventory and physical infrastructure with their related cost. The banking and financial sector are also in a major transformation, i.e. into complete e-banking and ATM self-served machines that are transforming its traditional banking set up and management approach. The above example illustrates the transformation in traditional business models that existed unchanged for over a century. This certainly affects and force a change in the management and organizational set ups for companies cooperating in such changing environments.

Flat, networked and matrixed organizations replaced the traditional formal and functional organization with less centralized top-down chain of command management approach into a more decentralized participative and democratic management style (Rayasam & Renuka, 2008).

The rise of the social entrepreneurship and its related management concept, which places more emphasis on a shared benefit to the society as well as the employees and less on shareholders who traditionally are at the centre of the enterprise attention in the tradition business model within private and commercial segments. This new movement includes the rise of the not-for-profit business models, as well as the public and government management and organization.

All the above-mentioned technological and social influences drive the researchers' and managers' communities to join forces and re-think the best ways to address the 21st century customer and societal expectations, as the pressure on managers continue to mount up to an extend some academic researchers described contemporary senior management teams as one that will most certainly have some personality disorders (Manfred & De Vries, 2003) from the pressure they are faced to satisfy different (and increasingly vocal) groups of stakeholders who have different expectations, objectives and needs, which in many cases conflict with the others (i.e. staff and management expectations versus shareholders, customers and the public).

The Organizational Challenge to Innovate while Delivering Results that Impact

Just like global climate change, organizations are faced with constant changes that are increasingly unpredictable and complex in nature, making it extremely hard for managers and researchers to explain them. Durability seems to be also a common theme in the two unrelated areas of climate and organizational changes.

While durability at the macro level is generally recognized as preserving resources (Through the responsible use of available means) for the use of the generations to come in order to sustain life in our planet for as long as possible. In organizations, it can simply mean the company ability to continuously innovate its product, services, processes and business model while still being able to deliver meaningful results that positively impact its own performance measured by its diverse stakeholder groups, all with the ultimate objective to increase the company lifecycle for as long as possible.

This challenging mission by many companies around the world to extend their lifespan and durability is evidently witnessed when we for example look at and compare between the Fortune 500 firms that existed in the early and mid-20th century versus the 21st century latest fortune 500 list, which reviles an astonishing 89% of the companies on the original 20th century list that disappeared from the current list. And many newcomers (e.g. Facebook, eBay, and amazon.com) are appearing on the list to replace some giant names (e.g. American Motors, Studebaker and others).

While at the macro global climate change level, biologist and scientist such as Charles Darwin explained the evolution theory in species, which people like Herbert Spencer used its principles in trying to explain economic evolution (The survival of the fittest). In the micro organizational level, the question about what makes a company "the fittest" to survive the test of time to continue to achieve greater result and maintain appearance in the fortune 500 list for as long as possible (As just one indicator). Adaptability, in species was a reason used by biologists to explain the survival theory, but what exactly can this mean for companies?

Major companies and even industries lost their market leadership position in a blink of an eye because of a disruptive innovation or an external unpredictable factor, which the company failed to predict and/or its impact. Take the examples of the Bitcoin that is bypassing traditional banks and clearinghouses with new technology. Airbnb outcompetes in the hotel and accommodation services through the home-sharing concept. Coursera and edX, among others, threaten business schools with massive open online courses (MOOCs). Uber sidesteps the licence system that protects taxicab franchises in cities around the world (De Jong & Van Dijk, 2015). Even in industries that survived for centuries without any major change such as the cigarette and tobacco industry where we are witnessing the impact of e-cigarettes on the whole sector, regulation and the way smokers consume the nicotine.

These disruptive innovations make major organizations and industries stand on their toes to prepare for the worst-case scenario, by always challenging themselves, their management approach and business model before they get overpassed by the innovative

Newcomers and unpredictable factors. Doing all of this preparation and planning while maintain their focus and ability to deliver daily results in order to sustain their leading market position, satisfying their customers, shareholders and own manpower, making nowadays organizations truly micro-complex systems.

In order to help with this important organizational challenge for durability (i.e. to innovate while delivering results with impact), companies started to introduce new management concepts to solve the challenge and simplify its own increased complexity.

For example, the introduction and increasing trend of the management by project concept in many organizations around the world is one important way that companies are using to get away from the traditional functional and bureaucratic management in the hunt for new ideas and effective delivery mechanism using a temporary "projectized" environment. Innovation management and the massive investment in R&D by modern companies and leading industries is another vivid attempt to sustain their ideation pipeline to keep up with competition and external unpredictable challenges.

Quality management systems such as the one from ISO (9001), and the new concepts of Lean, Kaizen or Six Sigma are all new management concepts that are used nowadays by modern companies in pursuit of optimizing their scarce resources, improving their processes and better reflect and address their customers and stakeholders' needs, which are all aiming to increase the company durability by changing and innovating the way they conduct the

daily business through gradual and continuous changes/improvements, while still focusing on the business results and key performance indicators.

But the question remains “Is this enough to be the fittest for survival?” and to extend the lifecycle of companies through innovation and result delivery. Can new concepts “managing by project,” “innovation management,” and or “quality management” work by themselves to address the ever-increasing organizational complexity? My observation and research in working with two international organizations that coordinated the work on behalf of companies and industries, at their senior management level, where ISO excelled in innovation and IATA outclassed in managing by project and program delivery, is that one new modern management concept (even if done superiorly) can’t work effectively by its own and in isolation, to solve complexity and address the innovation and result delivery simultaneous challenge.

Modern management researchers seem to also support the idea of multi-management concepts, Peter Drucker for example saw the basic task of a management as twofold: marketing and innovation. Although the two areas are linked, innovation and marketing are generally seen in companies as two different areas of business administration. This is to say that modern and contemporary management is about trying to integrate new management concepts to sustain the company activities for the longest possible.

This flexibility for companies to tailor-made traditional management streams is visibly seen nowadays in the case of using the lean principles to the organization and industry context, where it integrates project with quality management concepts in an adaptable way, offering yet again another creative way to combine two management disciplines (i.e. Project and lean-efficiency management) to achieve greater organizational results through the adaptive use of “lean project management” (Staats, Brunner & Upton, 2011).

This may explain the move ISO has made to try to increase their focus from just a single management standard (The example of the ISO 9001 in quality management and ISO 14001 in environmental management), to a more integrated management system approach based on their members’ observation of the increased implementation by enterprises and industries of several ISO management system in an integrated approach (Hortensius, 2013).

Companies achieve better overall results at all organizational levels when implementing ISO integrated management system (e.g. ISO 50001 in energy, ISO 14001 in environment, ISO 9001 in quality, ISO 26000 in social responsibility, ISO 31000 in risk management, ISO 27001 in information security management, ISO 21500 in project management, and others) as opposed to a single standard in isolation (e.g. ISO 9001). ISO emphasized the need to keep the integration simple to fit the purpose and nature of complexity of the organization and industry it operates within.

The use of the theory of complexity in modern management (Gupta & Anish, 2009) that tries to breakdown and conceptualize the complex organization as dynamic networks

of interactions. By applying and borrowing some engineering concept such as the system dynamics that looks at the aggregation of the total system and not at a single phenomenon, i.e. the result of HR management has direct links to the strategy and vice versa. This way the uncontrollable human factor can be studied and understood as an adaptive and integral part of the overall company system as opposed to treating people management as a function of HR only.

New Proposed Management Concept

From the international management work and research observation thus far, and in order to simplify today's organization's complexity, one should view companies as a total system. A modern organization with contemporary management in the private, public or social sectors, is mostly about supporting two key areas, firstly, innovation by creating new value to their different stakeholders in the form of new products, services and solutions. Secondly, project through result delivery to achieve and meet the stakeholders' ongoing expectation. And we can argue that everything else in the organization does in management such as Human Resources, Marketing, IT, and other important management functions should be mainly refocused to support the two areas of innovation and delivery.

Innovation, which includes the evolutionary and revolutionary types of ideas that aims at creating new or enhanced products, services or processes. While result delivery is about program and project management that takes the innovative ideas and prototyped

product and services into a delivery mode and assessing their success and overall impact to the wider stakeholder community from customers to shareholders, employees and society.

Evolution of Projects & Project Management Research

Just like we saw in the case of management, the concept of project as a temporary organized human activity to achieve a unique object or concept (Gilles, 2013) was in our lives throughout the history of human existence without necessarily a formalized project management methodology. This was categorized as the degree "minus one" by Navarre (1989). The different civilization competed to illustrate its social, political and economic superiority throughout major projects (e.g., the pyramids of Giza, China's Great Wall, and even the historical wars and invasions).

And in a relatively shorter phase, in between the minus-one and one degrees, there was an important rationalization and transitional phase in the history of project management, categorized as "the degree zero" when governments were the key driver for public-oriented projects during the colonial time at the early 19s century.

The discipline of project management started to attract the attention of researchers at a much later date in the second half of the 20th century when the project manager role was described for the first time "as someone who coordinates the contribution of different units for an efficient development" (Gaddis, 1959). This phase in the project management research history has been categorized by Navarre (1989) as the degree "one" when a standard model started to be defined.

In this phase (one degree), its' also when the project profession began to compete with the project management research, and the establishment of organizations like the Project Management Institute (PMI) in 1969 came to advance the profession of project management through its global standards, certifications, publications, and professional development courses. It was then when the professional definition of the project management activity described by PMI as "the application of knowledge, skills, tools and techniques to project activities to meet the project requirements" (PMI, Project Management Body of Knowledge, 2004) started to get more attraction globally.

However, it is worth noting that during the era of the early 1980s, the project management research was dominated by the professional associations like PMI, the International Project Management Association (IPMA), the Association of Project Management (APM), and the Australian Institute for Project Management (AIPM) which resulted in the professional body of knowledge but generally lacked the rigour and wide view that management or operation research was already enjoying from the academic world at the time.

This lack of strong academic involvement in the research of project management was mainly for what was then a perception of an overlap between where project management sets and the other mainstream research areas such as the decision science, organizational theory, and operations research. Project management was seen as being in the intersection between those different research areas and therefore lacked the attention it deserved from the academic community.

It was only until the early 1990s when the project management research started to gain traction by the academic world, hence improved the quality and rigour of the research and their findings, which started to appear more clearly in both the quality and quantity of research within the main project management journals (Turner, Pinto, & Bredillet, 2012), namely in: The International Journal of Project Management, published by Elsevier (IJPM); The Project Management Journal, published by Wiley (PMJ); The IEEE Transactions on Engineering Management (IEEE-TEM), published by the Institute of Electrical and Electronics Engineers Technology Management Council (Known before as IEEE Engineering Management Society).

The academic spread of project management has been accompanied by a steady growth in the number of researches that aims to contribute to the development of its knowledge base. These researches have been followed the developing interests in the field and application of project management in diverse contexts and industries. These studies try to extend the project management beyond the prescriptive, instrumental, and unreflective nature of early works, mentioned in professional bodies of knowledge.

Professional Review

This selective review of some of the major global professional organizational that are very involved in the project management arena is aimed to provide the point of view of the major PM practitioners with the aim to understand if any have started to notice the relationship between the two areas (Innovation & Project) that this research is interested to study.

International Organization for Standardization (ISO) is an independent, non-governmental membership organization and the world's largest developer of voluntary international standards. International Standards make things work. They provide world-class specifications for products, services and systems, to ensure quality, safety and efficiency. One of the new issued standards, ISO 21500: 2012 Guidance on Project management, provides high-level description of concepts and processes that are considered to form good practice in project management. New project managers as well as experienced managers will be able to use the project management guidance in this standard to improve project success and achieve business results. ISO provides major benefits as it encourages transfer of knowledge between projects and organizations for improved project delivery. ISO also facilitate efficient tendering processes through the use of consistent project management terminology. ISO enables the flexibility of project management employees and their ability to work on international projects. Likewise, ISO provides universal project management principles and processes.

While ISO is globally recognized for international standardization with famous management standards such as the 9001 in quality management, their work in standardizing project management can be seen as basic and premature. It didn't add a new thinking to the existing project management standards, and their work is mostly inspired by the PMI work, especially that PMI is the chair of the technical committee that is drafting the ISO 21500 project management standard.

The Project Management Association of Japan (PMAJ) formerly Known as the Project Management Professionals Certification Center (PMCC) along with the Project Management Institute (PMI) was chartered on 2003, merging with Japan Project Management Forum (JPMF) the oldest body promoting project management in Japan.

P2M, a Guidebook for Project & Program Management for Enterprise Innovation was released in November 2001 at the International Project Management Congress in Tokyo. P2M is providing Guidelines for Enterprise Innovation through program and project management and is intended to serve as a guide to assist in enterprise growth, competition and survival in the global business and public services environment, and competency standards of other international project management bodies. PMAJ has set the following mission goals; the first is to establish and promote the project management professional qualification system. Secondly is to facilitate innovation in the industrial community by maintaining and improving P2M. Thirdly is to provide a full range of services to PM practitioners in order to respond to social changes such as economic uncertainty and increasingly complicated requirements in many fields, not only in technical systems but also in social systems and enterprise management, project management must be capable of effectively solving these complex and complicated problems and manage projects and programs to promote value creation activities.

The PMAJ is a very interesting and excellent standard that for once started to attempt linking project management to innovation. This said, it is one of the least known or used standards outside Japan, making it seem to be a local standard for the country.

Project Management Institution (PMI) Founded in 1969, PMI delivers value for more than 2.9 million professionals working in nearly every country in the world through global advocacy, collaboration, education and research. PMI advances careers, improves organizational success and further matures the profession of project management through its globally recognized standards, certifications, resources, tools, academic research, publications, professional development courses, and networking opportunities.

PMI's standards for the project, program and portfolio management are the most widely recognized standards in the profession—and increasingly the model for project management in business and government. Because of this strong global presence and strength, rigidity and resistance to changes in their standard has been a noticeable behavior, which for a long time prevented them to investigate relationships between project and other aspects of management including innovation.

Projects in Controlled Environment 2 (PRINCE2) was created in 1989 by the Central Computer and Telecommunications Agency as a process for effective project management. When PRINCE was launched in 1989, it effectively outdated PROMPT, a project management method created by Simpact Systems, within Government projects. After that, PRINCE2 was published in 1996, having been contributed to by a consortium of some 150 European

organizations. Using PRINCE2 provides companies with greater control of resources, and the ability to manage business and project risk more effectively. The Key features of PRINCE2 are to focus on business justification, to define organization structure for the project management team, product-based planning approach, dividing the project into manageable stages and flexibility that can be applied at a level appropriate to the project.

PRINCE2 is based on structured project management which means managing the project in a rational, organized way, following clear steps. A structured project management method like PRINCE2 is a written description of this logical, organized approach. This standard has some good global awareness. However, PRINCE2 standard use and presence have strength in few specific regions of the world such as in few European countries and is commonly known or perceived to be a standard for managing IT projects only.

Academic Review

The main research in project management could be summarized in nine main project management perspectives that cover the school of thoughts within the discipline. Each school represents some common traits, styles, methods and ideas (Turner et al., 2010). The nine perspectives grouped into four main project-focused categories as shown in (Table 3).

Table 3: Summary of perspective categories underlining the most relevant ones to this research

Project Performance	Project Business	Project People	Project Solution
1. Contingency	4. Success	Behavior	8. Process
2. Optimization	5. Governance		9. Decision
3. Modelling	6. Marketing		

This research summarizes each of the nine perspectives and school of thoughts with some critiques to highlight both their strengths and weaknesses. It also elaborates on the perspectives that are the closest to this research hypothesis in studying the project relationship to innovation with their impact on sustainable development. These focused areas/perspectives are underlined in (Table 6) and are contingency, success, governance, marketing, behavior and process.

Project Performance School

There are three perspectives that share general objectives toward studying the project performance, one of which is the contingency that is very relevant to this doctoral research work, and the two others, the optimization and modelling perspectives are also covered in this review.

Contingency in Projects

The first perspective that closely links to this research subject is managing projects as an "Adaptive System." The main idea of this school of thinking is attempting to answer the long-standing research and professional debate on whether one size of project management tools and method would fit (or not) the different types of projects within their respective context (Turner et al., 2010).

The first and most common view is that while each project delivers a unique output, i.e. product, service, result or solution, it requires a set of similar tools and management practices to deliver that output irrespective of the overall context. On the other extreme, there is a second view that projects are better managed by project managers who have subject matter expertise in the respective industry. For example, in Information Technology, a Project Manager would be from the IT sector in order to deliver the project output successfully.

Rodney Turner had indicated this by differentiating between the technical skills the Project Manager should possess, which he argued is less important than competencies such as strategic and people management skills that are more critical for the project managers to be able to function effectively in different contexts. And with reference to the word "context," it was clearly needed to start a research effort to categorize projects, which allows for clearer definition, comparability, visibility, and control of projects. Recognizing that the benefit of such categorization system will also raise some challenges of the intent

of each trait. Therefore, a balance between comparability, visibility and control is required when categorizing the different projects (Crawford, Hobbs & Turner, 2005).

This categorization model depended on two key dimensions, one being the "purpose," i.e. whether the project is aimed at strategic alignment, capability development or others, and the second is about the "attributes," i.e. type of technology (high, medium or low), industry (pharmaceutical vs. aviation), geography (In the US vs. Nigeria), strategic driver (Market share vs. performance improvement), time (5 months vs. 5 years), cost ($100K vs. $100M), customer types (Internal vs. external), as well as other attributes (Crawford et al., 2005).

Based on the two-dimensional categorization system, the project management should use one or a combination of the nine project management perspectives, in order to successfully manage the final intended project deliverable. Firstly, optimization, when the context is highly specialized with a well-defined output that requires continuous efficient management of the triple constraint, i.e. cost, time, and quality (PMI, 2004). Secondly, modelling, when the project context is complex, multi-dimensional with several competing variables, for example the human interaction, which requires modelling to simplify the different phases and interactions between the various players within the project (Williams, 2002). Thirdly, success, when the project is measured based on its success, which requires a definition of the different interests to what can be considered success criteria (Waterridge, 1995). Fourthly, governance, as all projects require temporary organizations with clarified roles & responsibilities. The relationship of the different governing bodies is defined based

on cost-transaction or principle-agency to ensure overall project organizational effectiveness following the eleven principles referred by the Association for Project Management (2004). Fifthly, behavior, when projects deal with a diverse range of stakeholders, the project needs strong human resource management practices, and team leadership. Sixthly, marketing, when there is a need to communicate effectively to different range of stakeholders who often have different expectations of the project success. Seventhly, process, dealing with uncertainty in projects, especially in long, multi-year projects. The eighth item, decision, when projects require close monitoring and control to deliver its planned objectives. The ninth element, contingency, is the adaptation requirement to the different project contexts and scenarios.

To illustrate the importance of realizing the need for project adaptability based on the different context, an extensive study was conducted to better understand the impact of the human factor such as the cultural differences that could cause complexity within the project, as well as the geographical dispersion with project participants in different countries, and the economic development with variant in the GDP levels.

On the project management effective deployment, which assessed the project management acceptance and adoption using an index that computes the number of certified project managers within a certain population/group (Bredillet, Yatim & Ruiz, 2009). On the country aspect, the study used the cultural concept and dimensions by Hofstede where it stressed that a “management technique or philosophy that is appropriate in one national culture is not necessarily appropriate in another” (Hofstede, 1984). The cultural dimensions developed by Hofstede with key attributes such as the degree of power distance, degree of

uncertainty avoidance, individualism versus collectivism, masculinity and femininity are used to measure the differences between countries and groups with the objectives of categorization, correlation and association.

Seventy-four countries were included in the study (Bredillet et al., 2009), out of which 40 were grouped as low-GDP nations based on a GDP/Capita of less than US$ 21K, the remaining 34 countries had a high-GDP group with a per capita more than $21K that is the mean of this sample.

The key finding of this data analysis had clearly illustrated the need for adaptation in project management and avoid the notion of one size doesn't fit all; it revealed the following main points; the project management deployment is better in countries that have a low uncertainty avoidance and power distance, and high in individualism. And the PM deployment was also found better in countries with stronger economic performance (High GDP/Capita). And among the high GDP/Capita countries, the project management was better implemented in the low power distance and low uncertain avoidance countries. This school of thinking presents how and what project management is going to be all about in the near future, especially in highly complex, global, often long and costly projects, when project adaptation is not just an option rather a necessity for success.

From an industry view, and in aviation, major manufacturers such as Airbus embed the concept of adaptability within their projects during the design and assembly phases. Even though such adaptability could at times cause them delivery delays, like the case of the A380

delays and its direct impact on the projects' immediate cost and time. The long-term benefit and impact to the customer and aviation industry is clearly more weighted than the short-term delays since the project had overall contributed to the increased capacity and global connectivity combined with the gained efficiencies. Similarly, the delays and extension of the ISO international standard 45001 in the Occupational Health & Safety to ensure it adapts to the different industry, profession and country requirements could positively impact its adoption and acceptance by the different organizations within the various geographies.

The project management profession through its biggest international organization, the Project Management Institute, which was one of the major advocates for the "one size fits all principle" in project management, has started to notice this need for project adaptability and hence developed in recent years a new international standard beside its traditional PMBOK water flow framework that takes into consideration the adaptive system "Agile Project Management Principles," which was developed by PMI in response to the increased demand by the international community of practitioners for the more project adaptability "fix on the flow" while executing the project based on the customer requirements.

On an ending note about the advantages of this school of thinking, it can be argued that project management methodology is the key to innovation since in principle, it should allow for continuous feedback and progressive incremental to adjust scope. This argument may not hold when we talk about traditional optimization models that call for and discourage

from customer change requests and treat them as potential risks instead of viewing them as opportunities.

On the flip side, one has to be mindful of the fact that opening the concept of adaptability in project management could conflict with the essence of why project management was first used for, and that is to coordinate the efficient delivery of a specific time, budget and scope. Therefore, there is a real risk of inefficiencies when using this type of project management philosophy.

Finally, with regard to the project categorization framework (Crawford et al., 2005), it's also worth to note that the frame is to an extent rigid with just two-dimensional view on projects. It can benefit from some adaptation. For instance, there is a need for a more dynamic categorization system that integrates the fifteen attributes with the purpose of the project, adding the customer (internal or external) as a standalone 3rd-dimensional reference point. This needed especially that the whole notion of adaptability is and should be centred on satisfying the customer requirements.

Optimization in Projects

Project management was started as a branch from operation research theories and had historical links to operations management since the early start of management during the Taylorism era that assumed human work as close as possible to machines in the factory. Therefore, this perspective is focused on optimizing the project activities through the most

efficient use of their resources as “inputs” to create an optimized final result as an “output.” This early link between operations and projects since the 1940s resulted with tools that were transmitted from the world of operation into project management for the maximum optimization purposes. Tools such as the GANTT bars to measure project scope and tasks progressions, the PERT and Earned Value indexes that are meant to control cost and resource utilization, and finally the best known Critical Path tool for time and schedule measurement. As shown in (Figure 22).

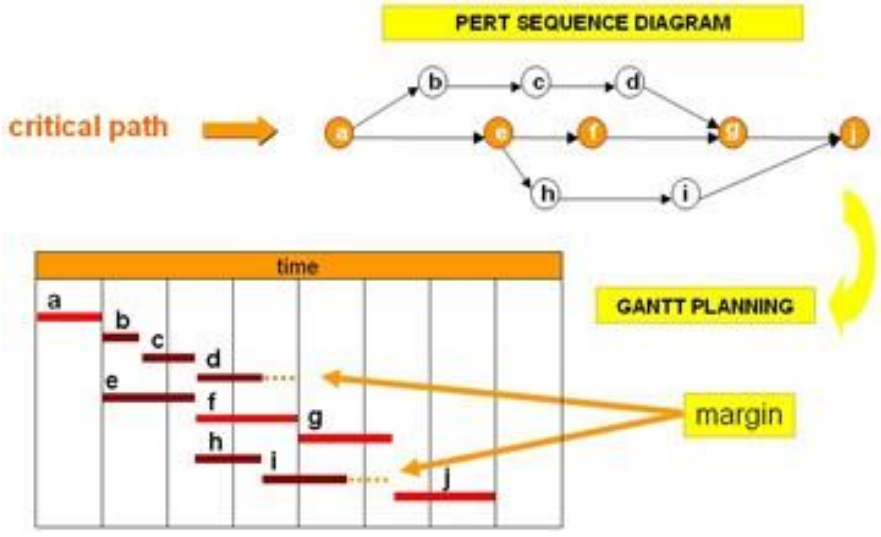


Figure 22: Project GANTT, Critical Path and PERT Illustration
Source: MDC System, 2018, p.2

The big advantage of this perspective in project management is that it brings it back to where it was first created as a needed mechanism to coordinate work across units in an efficient and optimized manner, so cost efficiency and scope performance control are key elements in this school. Oppositely, it surely can hinder the quest for innovation and risks the adaptability factor that is key aspects of modern management and could fail to address the increased complexity from the unpredictable risks.

Modelling in Projects

This perspective aspires from the system theory and has also strong links to operations research such in the optimization case. This perspective is narrow-angled with assumptions of linear progression in a controlled project environment where scope changes and elaboration don't exist. These models that are mathematical and logarithms in nature such as in the case of the sensitivity or scenario analysis, it considers one or two variables to assess, predicts and plan the possible outcome of the project and therefore selects the most efficient way for production.

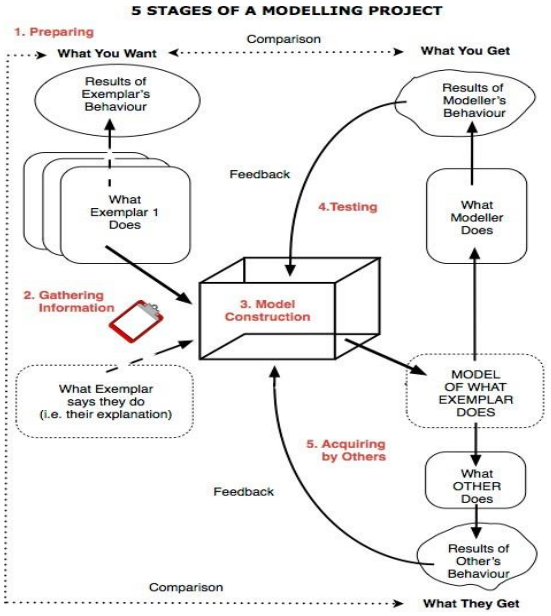


Figure 23: Project Modelling Example- 5 strategies of modelling project Source: Tompkins & James, 2006, p.3

The weakness of this perspective is tied to its nature of being narrowed and assumes controlled and unchanged environment that is quite rare to find in modern, complex and diverse management, which extends beyond matrix organizations crosses the defined

geographical and business boundaries. On the other side, this school offers alternative project possibilities and completion path scenarios, hence could be used as a planning tool for optimization purposes.

Project Business School

As part of the economic view on projects, the key focus area is to evaluate the product development and innovation as well as the R&D cycles in businesses and their relation to projects and project management (Artto & Wikstrom, 2005). All three perspectives in this area (Success, Marketing & Governance) are relevant to this doctoral research topic.

To briefly introduce this area, it is important to remember that the simple concept of innovating something new is in a way linked to what projects are intended for, which is to create something unique. Both are linked to the basic idea of development (Brady & Hobday, 2012). Trying to figure out the effect of innovation on the general aspect of human life, Robert Gordon presented a graph in NBER Working Paper in the year 2012, where he expressed average annual GDP growth after a meaningfully innovated idea introduced to the society. This area in project management was thoroughly discussed in the first chapter under the innovation dilemma subsection 1.1.

Success in Projects

The fourth perspective is the way projects in general and in some industries and sectors like in aviation, and international standard development is being measured for

success compared to other project-matured industries like in the IT sector. Still till date, many of the project managers and stakeholders in several industry sectors confuse between the notions of success criteria and success factors (Turner et al. 2010). Many companies, including airlines as an example evaluate the project success based on its conformity to the triple constraints (Time, cost & quality). Rodney Turner, Roxanne Zolin and Kaye Remington have developed in 2009 an excellent project success integrated model which compares stakeholder views at the immediate project output, outcome and impact. One of the major success criteria in innovation projects is linked to their impact in society. This link is somehow captured in the third pillar of this planned doctoral research that is the "Impact" concept of the innovation projects.

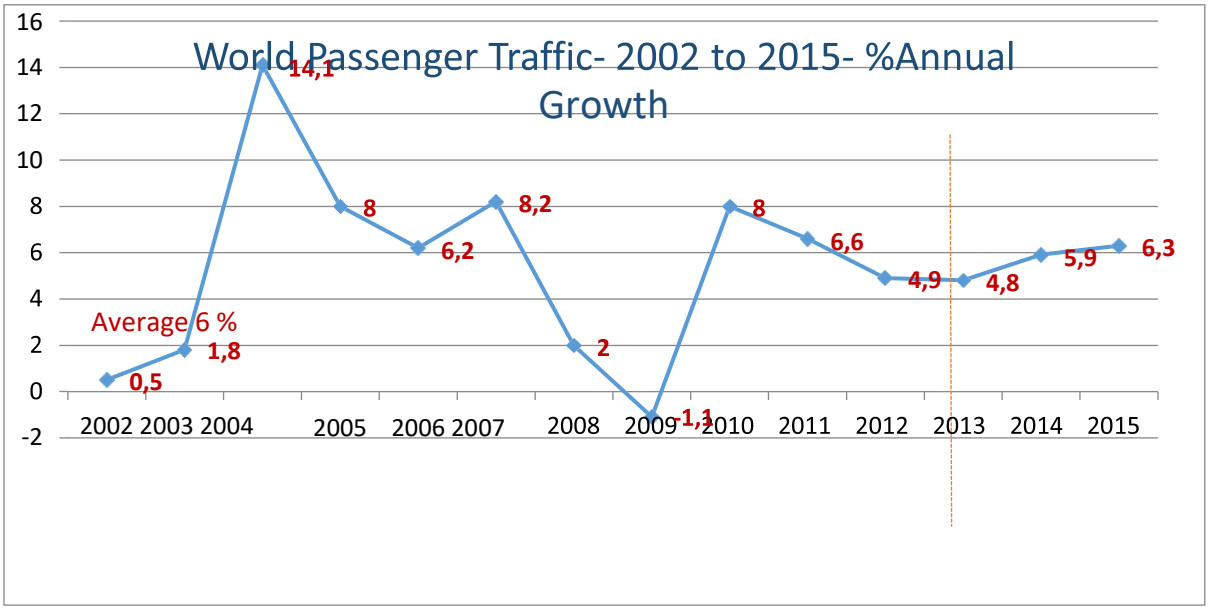
As per a study by the World Bank in 2006, "impact evaluation examines the changes that can be reasoned to a particular intervention, like from a project, program or policy, both the intended ones, and the unintended ones" (White, 2006). The socio-economic looks at the relationship between economic activities and their effect on the social process and vice verse, therefore, this doctoral research on evaluating the innovation projects impact on the socioeconomic activities is directly linked to the concept and definition of the sustainable development.

Impact in projects is a long-term assessment vis-à-vis its short & midterm output and outcome goals. This differentiation between the direct output, outcome and longer-term impact of projects goes very well in line with the definition of sustainable development, which aims at both the present needs (Output) without compromising the ability of future

generations to meet their needs as well (Impact). The project success, especially the innovation projects context is increasingly evaluated based on its long-term impact, and its direct effect on the economy and social development. The social acceptability is what makes the impact of the innovation project stand the test of time sustainably for the future generations.

To illustrate the concept with an example from the aviation industry, there is no doubt that the demand for the air transport services in both the passenger and cargo streams will continue to increase with the growth expected in the middle-class especially in Asia as illustrated in the below Airlines International IATA Report, as shown in (Figure 2).

Figure 24: Air transport growth forecast
Source: IATA website



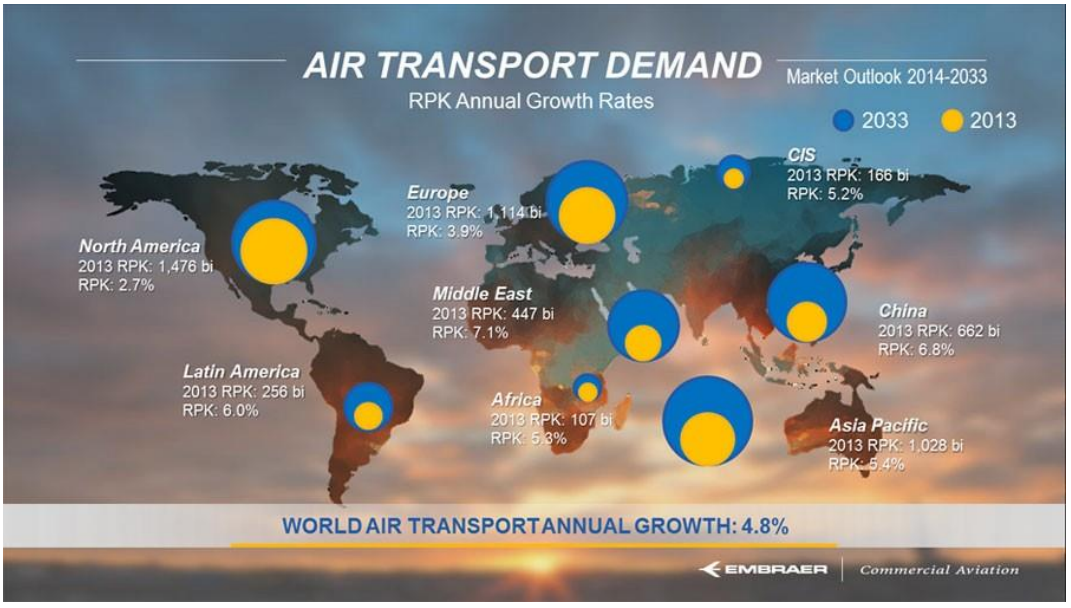


Figure 25: World passenger traffic
Source: IATA website

To sustain this growth in demand, the manufacturers of new aircraft will have to think differently and start new innovation projects to develop new aircraft models that are efficient with bigger capacity. The impact of this innovation on the extended value chain is that firstly, airlines would save cost of fuel and improve their current slim operating margin. Secondly, society/and future generation of passengers will have more accessibility through affordable ticket prices with more options to travel by air. Thirdly, governments will achieve their goals to reduce CO2 emission. Fourthly, manufacturers will be able to sell smarter aircraft to airlines.

And in comparison, the international standard development sector measures its projects' success based on the longevity and adoption of its released standards by the

different industry users and countries. It gives little weight to the project outputs like cost, time and scope, which clearly benefits the innovation part but makes the projects less efficient and agile. The aviation industry and standard development sector differ from the project success definition in the IT sector that is more in tune with the key outputs and outcomes of the projects (Triple constraint), while still maintaining its long-term impact through the customer-centric agile project development processes.

Project Governance and Organization

Corporate governance is an essential concern for investors and investment analysts (McEnally & Kenneth, 2012). It is the system of principles, policies, procedures, and clearly defined responsibilities and accountability, used by stakeholders to eliminate or minimize conflicts of interest. The objectives of a corporate governance system are 1) to eliminate or mitigate conflicts of interest among stakeholders, particularly between managers and shareholders, and 2) to ensure that the assets of the company are used efficiently and productively and in the best interests of the investors and other stakeholders.

Depending upon the nature of the company and the industries the project is defined in, the best practices of corporate governance vary but there are common ones which can mitigate the risk of the conflict such as; a majority of the board of directors are independent, outside, knowledgeable, and of high integrity. Also, the chairman and CEO are separate individuals with the chairman as an independent, outside director. Likewise, the compensation committee is made up exclusively of independent, outside directors. And the board should

retain outside auditors with no conflicts of interest (such as providing consulting services to the company).

The landscape of research on project governance is diverse. From day today work in projects to strategic levels, such as portfolio management, strategic PMOs, or the board of directors. Söderlund (2004) implied different governance structures depending on single versus multi-project structures. Studies on the relationship between governance type and organization performance presented that the governance in multi-project organization is typically implemented in one of four possible situations. Multi-project organization, without synergies across objectives or resources, program driven organization, seeking synergies among objectives, portfolio driven organization, seeking synergies in resources and skills allocation, and hybrid organization, combination of program and portfolio approach.

Backed by Muller, enterprises apply different governance paradigms in different parts of their organizations, based on their idiosyncratic objectives, knowledge of the need and resources of the organization regarding its tasks, preferences of the leaders, market demands and the maturity of the project management. All these functions are performed within the limits set by the corporate governance framework and legitimacy of action within the social context. According to some quantitative and conceptual studies in the area trust within the project governance, it revealed a non-linear relationship between controlling and trusting in projects, therefore allowing for a replacement of one by the other, with some limitations to be considered. (Muller, 2017).

One major advantage of a strong project governance through an independent Project Office (PMO) or an organization managed by projects is that they can reduce traditional corporate bureaucracy, which usually slow the base of result delivery. Additionally, with an advanced integration between projects governing structures like PMOs with the innovation and development governance such as R&D or business or product development, the acceleration of innovation and business and product realization could multiply.

Below project governance and structure example, illustrates the link European Union is attempting to strike between the delivery (Project) and innovation (Scientific) governance structure in the case of Innovative Medicine Initiative Joint Undertaking (IMI-JU). The Project Coordinator is the intermediary between the Innovative Medicine Initiative and the consortium in all scientific and industry-related concerns (Newmeds, 2016)

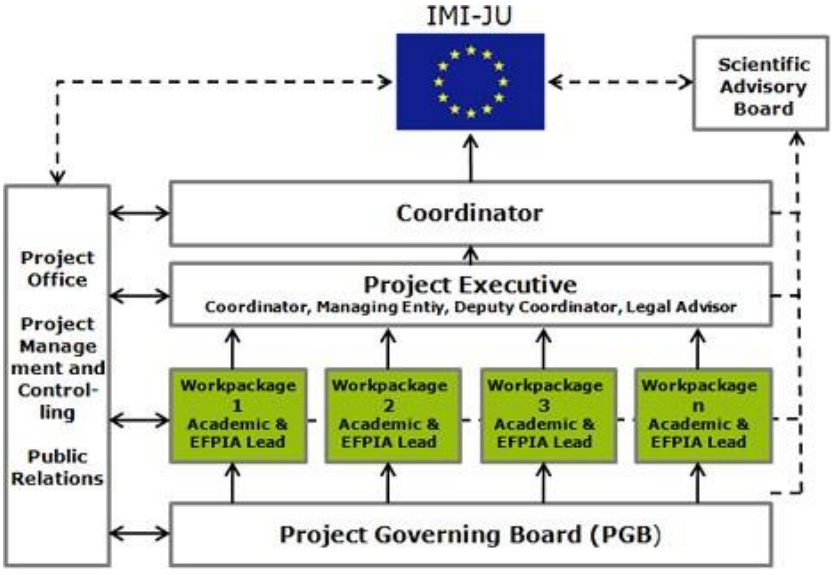


Figure 26: Project & Innovation Governance Interaction Example
Source: Newmeds, 2016

A weakness could be that it may create structures within existing corporate structures, and if the relationship, roles and contracts are not defined well, it may be a source of increased complexity and confusion within organizations. In the case of standard development, project management was recently explored to fix the usual delays in producing the international standards on time. One main reason is the lack of project governance and mixing the creation part with the delivery in a non-structured manner.

Project Marketing

This business perspective calls for the relationship and communication with the project diverse stakeholders. Considering each group independently, in trying to understand their motives, influences and interests for the project and building a marketing and communication plan to rally them around the project overall objectives. For the project team, it is important that the project manager promotes the value they would get from participating the temporary project structure, such as the knowledge and career growth opportunities post the project lifecycle. For the customer, it should be the end innovative result or product and its value proposition. For the organization and sponsors, it could be the return on investment, payback period, sales, transformation, or optimization goals.

Whatever is the marketing approach, managing projects using this perspective has a clear advantage when driving organization, or industry-wide, country or across regional change and transformational strategies through innovation where the Project Manager clearly benefits from strong communication and marketing skills to pursue and convince the

different stakeholders who can have conflicting agendas, so finding a common project goal and objectives is a clear strength for this school. We see this clearly in the case of driving new aviation transformational projects when passengers are being convinced of the benefits of the project to their travel experiences, for example the project of rolling out the e-ticketing in all airlines and airports around the world.

Figure 27: Airlines E-Ticketing project marketing example

Source: Jet Airways website

On the weakness side, this perspective can prove to be devastating if the project team overuses this method without a solid project and business plan. The lack of a clear process behind the project marketing approach can jeopardize the credibility and therefore success of the project. A recent example of trying to drive a new airline distribution system project without a clear implementation plan and value proposition map for all stakeholders, delayed the implementation of this strategic project within the industry worldwide.

Project People School

Human Behavior & Leadership in Projects

This perspective is to study the project and the development/innovation from a purely human and leadership aspects. Since the human factor is a vital component to the projects that are social systems, as well as to innovation that depends on people both individual and collective creativity. In innovation, the ideation phase is when new ideas and concepts are expected to be created, and there is the human factor (Flin, Winter, Sarac & Raduma, 2009) generally defined as the individual characteristics which influence behaviors at work and in life has arguably the biggest impact on the ideation phase.

We can break down the type of ideas into two main categories to help understand the impact of the human factor in the ideation phase. Firstly, revolutionary in nature, breakthrough concepts or thoughts that go beyond traditional thinking. For these types of ideas to surface, it usually requires an extremely high level of the human intellectual capabilities that can be partly measured through the intellectual quotient (IQ) of an individual human being. Secondly, evolutionary in nature, which represents the majority of new ideas in the professional world.

Therefore, these types of ideas usually require an extensive open collaboration and collective work between internal and external parties based on egalitarian (everyone can join, no principled or artificial barriers to participation exist), meritocratic (decisions and status are merit-based rather than imposed) and self-organizing (processes adapt to people

rather than people adapt to pre-defined processes). The implementation phase through project management on the other hand (which is the prime focus of this perspective and research) requires a stronger scoping and management roles in comparison with the ideation phase. Having said this; this phase shares a similar need for the leadership and human aspects to the ideation and new product development phases.

Project management has three main phases (PMI, 2004) starting with the initiation phase when the project manager takes over the idea after validation and start planning for how to convert it into a real product, service or solution (Actualization). In this project initiation step, the project manager is working solely with a limited number of stakeholders (including the idea sponsor). The initiation step in project management is followed with the important execution phase and there where the project manager starts playing more of a leadership role with more human interactions than any other step in the project within the project social system.

In the important execution stage, a project manager should develop and exercise a high level of social intelligence (Honeywell) (SQ) to effectively negotiate complex social relationships, especially in complex and global project environment that require constant interaction with internal and external stakeholders to drive the project through realization.

And for the purpose of this study to better understand this social intelligence capability a project manager should have the following human intellectual competencies; firstly, emotional intelligence (EQ) competency with the ability for the project manager to

self-control her/his emotion and those of other stakeholders based on the thorough review and understanding of each stakeholder (including project team) interest and influences as well as their personality traits from openness to introversion, and the big five personality traits (Costa & McCrae, 1992) therefore their motivation and emotions. Secondly, cultural intelligence (Livermore, 2009). (CQ) competency with the ability to work effectively with different culturally diverse groups starts with understanding some of the basic yet fundamental different cultural dimensions, such as individualism vs. collectivism (e.g., an American vs. Chinese project team members), femininity vs. masculinity (e.g., a Swedish vs. South African project team members), high vs. low uncertainty avoidance (e.g., an Egyptian vs. an English team member), and similar analysis would apply to differences with the departments of the same company (Finance vs. Marketing) or industries (IT vs. Farming) (Hofstede & Minkov, 2010).

If the project manager develops the above two important bits of intelligence (EQ & CQ), s/he will most likely possess a high social intelligence (SQ) capability to navigate and drive complex projects with several stakeholders and cultural groups. The graph below demonstrates the importance of the human factor in the new product and innovation cycles (Including the implementation/project management phase).

This theoretical framework based on observation as part of several complex projects in the aviation, standard development, and IT industries goes to confirm that projects (and in fact ideas) success is highly dependent on the degree of human factors and the combination of the different social intelligence (EQ + CQ = SQ) that are wisely and timely deployed (with a

high degree of IQ) to achieve the final project deliverable with the desired economic and/or social impact, this can be shown in (Figure 28).

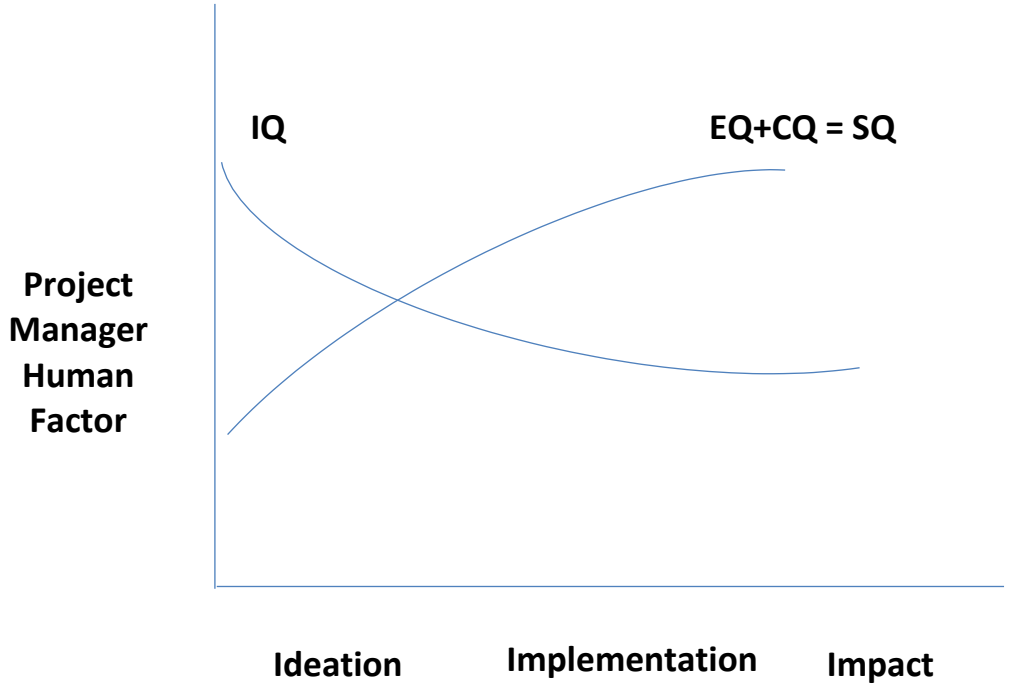


Figure 28: Human intelligence in the new product & innovation cycles
Source: Researcher's illustration

A question that mostly discussed in this school of thought is the extreme difficulty to find or try to develop an individual leader (e.g., project manager) who can possess all the above social intelligence. Especially that in the professional work environment, individuals with very high IQ rating are often less active socially and suffer a lower level of EQ and therefore SQ (Exceptions are also noted).

The above challenge led the studies to the other concepts and definitions for leadership that goes beyond individualism and lean more toward collectivism. The

leadership team complementary concept resonated well with the findings that are in order for a project manager to succeed in managing complex projects with different stakeholders and even cultural groups, s/he has to form a strong leadership team around them with personal traits and potentially cultural dimensions that complement the project manager's personality and cultural gaps (Miles & Watkins, 2007).

It's expected that the individual project manager leadership primes during the initiation phase when s/he is expected to work solely with fewer number of stakeholders (mainly project & idea sponsor), the picture slightly start changing when the execution phase begins and a project manager should start to form a leadership team who can complement his/her weaknesses to drive the project/idea implementation by navigating together through the different stakeholder groups.

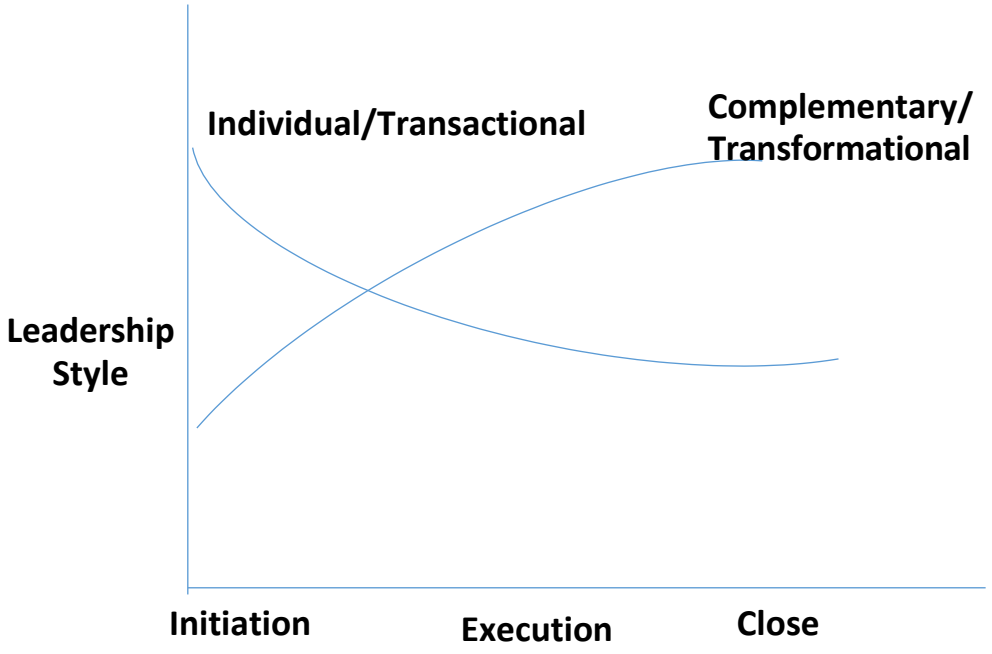


Figure 29: Leadership dynamics (individual vs team) in project cycle
Source: Researcher's illustration

This concept is often neglected, and the project manager focus tends to be to bring the smartest and brightest of resources based on the task competency requirements. However, major aviation projects, for example, the launch of Heathrow airport terminal 4 in London failed due to the lack of soft skills.

Project managers often think with a transactional mindset with a problem solving, short-term goals and objectives, clarity in roles and responsibilities, which is very efficient and effective for the project, however, as shown in (Figure 29), it's best used during the initiation and planning stage where discipline and detailed scoping of planned time and resources are required (Vera & Crossan, 2004). While the transformational leadership style (Hay, n.d.) that tends to engage emotionally with project stakeholders and create a bigger sense of direction to the project is much needed during the implementation phase with the introduction of the human interaction between the several stakeholder groups.

To put this complementary leadership model into practice, let us envision a situation where a Project Manager (PM) who's an extrovert, open and strong with planning and strategy-setting. The Canadian Project Manager in this situation can culturally be a low-power distance person, with very high scale rating in individualism, high in masculinity and low in uncertainty avoidance with a long-term orientation. The project manager is mandated by Air Canada to open a new airline route from Montreal to Beijing in China within 4 months with project team members who are based in Canada and China.

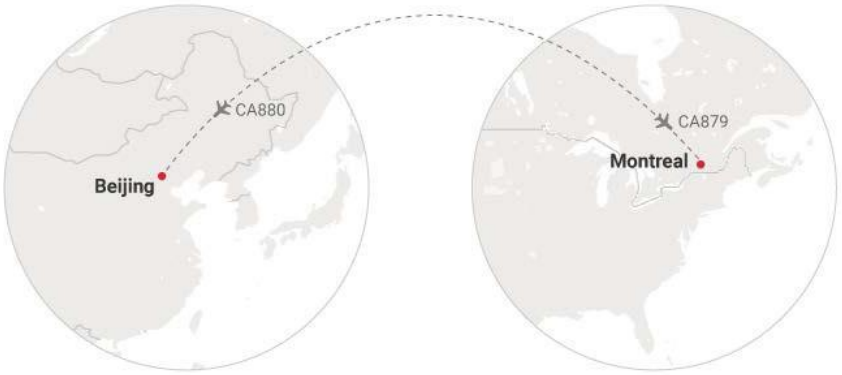


Figure 30: Airline Route illustration from Montreal to Beijing
Source: Air China Website

In order for the project manager to succeed in implementing this new route within the defined time and cost, s/he should be able to form a leadership team (team leaders) who isn't just expert in what they do but are able to help the PM deliver on time, cost and scope. A step the PM took was to appoint a colleague working in Air Canada in Vancouver who is also a Chinese by origin to be a team leader in order to effectively communicate with the high-power distance, high uncertainty avoidance Asian team and government stakeholders based in Beijing, China.

He also hired a detailed oriented short termed team leader from France to look after the daily transactions and project progress against its planned cost and scheduled time. While the PM assumed the responsibilities of communicating with the senior management and project sponsors about the progress made and risk with the support the project requires. This simple example illustrates some of the complementary leadership and human aspects that can be employed in a complex project to deliver the desired project and business, product or service objectives.

Project Solution School

This project category is centred on achieving the final project deliverable whether a unique service, product or result. It has two perspectives one of them (Process) is close to this research on innovation projects with impact.

Project as Process

To achieve success in projects with the desirable end solution that meets the various stakeholders. This school of thinking argues the importance of configuring standard project processes to simplify the project complexity, especially the uncertainty while enabling for the project vision to translate into portioned steps and actions for the actualization of the solution. The project management process themselves were set to break down the main phases and activities to achieve the final project deliverable.

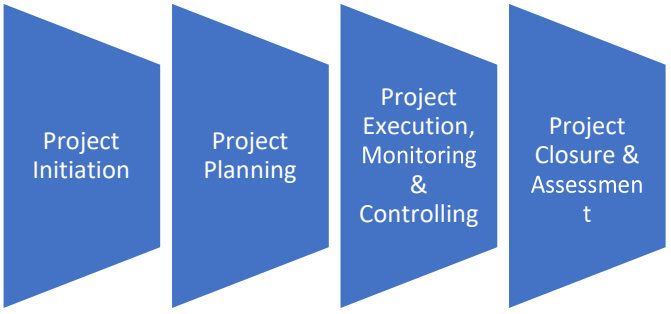


Figure 31: Standard Project Management Processes
Source: Researcher's illustration

Defined process has a clear advantage also in facilitating project knowledge transfer and handover activities. It also allows for efficiency gains through the repetition of the standard processes. And finally, can form a continuous quality improvement cycle of feedback is collected and inputted back into the project.

On the weakness side, standardization of the process may limit the possibility for innovation and change. To illustrate with a living example, PMI dominated the world of project management for 50 years because of its defined standard processes (Above figure), which helped simplify and unifying the project realization activities across the world and different industries but may also have limited the innovation and creative delivery styles that this research is questing for.

Project as Decision

In relation to the above perspective on the project as a process, each of the process streams, i.e. at the initiation, planning and while executing and closing the projects, the project will have to be managed through some dynamic decision steps. Right from the start when the PM begins to scope the project requirements and create its baselines through asking decision questions to the sponsor or client, and all the way through to execution, when progressive milestones are to be validated with the client or subject matter experts internally and externally in an agile and customer-centric approach.

This perspective has the advantage to increase the project quality and therefore the final product acceptance by all stakeholders since it is often built around structured decision

making key steps for quality and performance validation throughout the project processes. This said, managing projects following this school of thought, can also result in creating a slow project machine that could have a negative impact on the project schedule activities, scope and overall cost. Since each of the decision validation points could result with further scope elaboration/creep or yield with conflicting expectations by the various stakeholders, which appears as they validate the smaller portions of the desired final solution.

Innovation & Innovation Models

On the other spectrum is innovation, which is the second cornerstone of this research after project. Like the "project" concept that existed throughout the different civilizations, societies advanced their social, cultural, political and economic status through science and technology developments (e.g., the impact of the invention of the electricity, the first aircraft, and nuclear technology etc.). On the other hand, the discipline of innovation attracted more research attention compared to the project management area. The focus, however, was majorly in the technological innovation area (Brady & Hobday, 2012). Friedman argued that the solidity and reliability of a model are assessed based on its predictability factor more than its assumption (Friedman, 1953).

By the same token, the innovation models themselves evolved through different five generations (Rothwell, 1992). The post-world war times was described by Rothwell (1991/92/94) as the era when progressive waves of technological innovation in corporation began. Rothwell categorized the innovation models into five generations spanning from the post-war era between the 1950s to mid-1960s with the technology push models that

assumed scientific research and discoveries were the main driver for technological innovations, up until post-1990s with the fifth generation that relied on use of advanced electric tools in order to speed up and increase the efficiency of new product development across an entire network.

Opening yet another door to explore the possibility for a sixth and even seventh—generation of innovation models that further integrates the common attributes between innovation and project systems that are by paying attention to create unique solutions that comes through coordination with the aim for development, while respecting their own specific features. One (Innovation) being open and the other (Project) is scoped, using dynamic models to solve real complexities at the company, industry and country levels. And although the innovation in complex product systems (COPS) did explore some links between product development and projects in the high-technology industries, new research is required to understand the link between innovation and projects in other industries (Brady & Hobday, 2012).

Even in recent attempts to analyze linkages in innovation within firm such as in the Oslo Manual on innovation, it focused on areas related technology with limited view on non-technological innovation. It looked for relationships with regard to how innovation starts and triggered with limited elaboration on the "how" part of the equation that is what firms need to do to accelerate and manage innovation, and the links it needs to have with other management processes, and organizations (OECD, 2005).

Links between project management and innovation models

The simple concept of innovating something new is somehow linked to what projects are intended for (i.e. creating something unique). Both are linked to the basic idea of development (Brady & Hobday, 2012). Innovation and change in organizations are often dependent on projects, one-time initiatives to lunch new products, and new processes. The project is usually the means by which innovation takes place. Therefore, projects are key way of organizing innovation and the innovation is a major output of certain kinds of projects.

According to the aforesaid defined innovation generations, it is likely that the first generation of R&D push model is associated with the defence projects, due to the required science push version of innovation. As the use of projects spreads from military into business, more attention started to be paid to customers under the name of market pull model. However, the second and third generation innovation models have not affected project management's approaches largely.

On the other side, the fourth-generation model of innovation made a major development in project management practices. The high levels of cross-functional integration in this model led to emergence of different models of project organization such as matrix management, or emergence of different leadership requirements for project teams.

It is tried to use simple historical examples to illustrate the link; some ancient Egyptian civilizations innovated the concept of dams (According to some archaeological evidence) to preserve water for the dry seasons, this innovation helped advance their socio-

economic and political status. And in order to create the first dam, they needed to organize their human activities and natural resources in a certain way to coordinate the production of that final future outcomes. There is a shared fundamental in today analysis regarding countries and the role of innovation in the total output. Backed to the aforesaid GII index 2013 the top ten countries, Switzerland, Sweden, the United Kingdom (UK), the Netherlands, the United States of America (USA), Finland, Hong Kong (China), Singapore, Denmark, and Ireland, reached to this position by improving their output pillars specially Knowledge and technology one.

On the other side, if we look at the company level, the link between the project management and the innovation models has been looked especially by examining the first generation of innovation models (Technology push) when R&D is expected to come before new product development. This sequential process suggests in a way the project management process as a part of the development lifecycle (Brady & Hobday, 2012). The link between the project management and the second & third innovation generation models remained minimal with the integration of the market and customer feedback. However, the link between the two areas started to pick up again during the times of the fourth-generation innovation model when integration across the different functions (and the matrix management) started to require across team coordination and the project management was part of the solution to coordinate efficient delivery across functions.

Innovation & project management integration

Although it's going to be a challenging objective to advance this area, it can be found a potential unique angle to further examine the relationship and links between the project and innovation management. The integration between project management and innovation research is very limited, opening the door for more research work to be done to examine a stronger link between the two areas (Brady & Hobday, 2012). Some few researchers suggested that project is one form of innovation, however, didn't clearly outline the intersection points between the two areas (Thomas, Cicmil, & George, 2012).

By the same token, the innovation models themselves evolved through different five generations, the latest of which is the fifth-generation systems integration and networking models post-1990, opening yet another door to explore the possibility for a sixth and even seventh generation of innovation models that further integrates the common attributes between innovation and project systems (the attention to create unique solutions that come through coordination with the aim for development), while respecting their own specific features (one being open and the other is closely scoped), using dynamic models to solve real complexities at the company, industry and country levels (Rothwell, 1992).

The modern challenge across the different organizations in one industry value chain (e.g. Aviation) or in several sectors (Technical Committees), and arguably even across the different countries is pretty clear, that is to fuel innovation while being still able to deliver results with agility to respond to market needs proactively in a sustainable development manner (Social, environmental and economic impact). And therefore, the question is how this

research work can help address this innovation realization and project delivery challenges at the company, industry and country levels.

Impact evaluation

Another angle the study will attempt to study in my research, which can lead to a potential unique finding, is the way projects in general are being measured for success. Up to now, many of the project managers and stakeholders in the industry confuse between the notions of success criteria and success factors (Turner et al. 2010). Many companies evaluate the project success based on its conformity to the triple constraints (Time, cost & quality). The Turner et al. (2009) project success integrated model that compares success criteria depending on the stakeholder group looking at three different levels; the immediate project output in the short-term, outcome in the med term and impact in the long term. And this success criteria model is worth examining in the Pro-Innova context, adding the fact that the "impact" measure in Tuner et al. model (2009) can benefit from further elaboration and definition. Example, how to evaluate the "impact" and in several dimensions? i.e. the company, country, industry, and socio-economic levels. The Theory of Change (Brest, 2010), as a logic frame, is a helpful tool for analyzing the design, delivery, results and potential impact of Pro-Innova. It provides a realistic way to address causality and linkages between purpose and result.

To illustrate the concept in today complex and dynamic project structure leads to introduce new level of risk and uncertainly to projects. Uncertainly in project networks can be explained by the following factors; firstly, different stakeholders (identities): the best

practice to identify and manage this risk can be explained by Stakeholder Impact Analysis. Its purpose is to force the company to identify which stakeholders are most crucial. Therefore, the SIA should identify relevant stakeholders, their critical interests and desires, their demands, prioritize the stakeholders, and design a business plan to meet critical concerns.

Secondly, asymmetric interest of stakeholders: there are many different stakeholders in each organization with different kinds of interest. Stakeholders' goals can conflict with each other and with the best interests of the company for example, customers seek stability and product choices plus low prices (Lower revenue), suppliers, including creditors, seek stability and higher prices (Higher expenses), unions are an external stakeholder representing internal employees. They seek stability plus higher wages and benefits. (Higher expenses) and governments provide rules, local communities and the general public provide infrastructure (They can disrupt company operations). However, a project manager should bear in mind that the most important stake holder of each company is its stockholders because those are the persons who supply the risk capital to support the business, if dissatisfied, they can sell their stock or refuse to buy new stock which leads to increasing the cost of equity capital.

Thirdly, social and institutional risks: sustainable investing has an ethical component but is distinct from socially responsible investing. Takes a responsible position where companies meet society. The "direction of travel" is to see sustainable investing as more and more important going forward. Involves environmental, social and governmental factors.

Complexity

Projects aim to achieve certain level of coordination in order to simplify complex interaction inside and outside the project. There is another argument to approach the complexity in the system using design and system thinking. Designers have traditionally focused on enhancing the look and functionality of products. Recently, they have begun using design techniques to deal with more complex problems. As an approach, the design thinking analyzes capacities we all have, but that are overlooked by more conventional problem-solving practices. Not only does it focus on creating products and services that are human focused, but the process itself is also human oriented. Design thinking relies on our ability to be intuitive, to recognize patterns, to create ideas that have emotional meaning as well as being functional, and to express ourselves in media other than words or symbols. Having said that, it is clear that nobody wants to base an organization on feeling, intuition, and inspiration, but an over-reliance on the rational and the analytical can be just as risky. Design thinking, the integrated approach at the core of the design process, provides a third way (Brown and Katz, 2009)

Therefore, it should mention that besides the four HSBC (Human, Success, Business & Contingency) factors in projects, the study should analyze the role of the complexity in the system. How a single project manager could put all of these different perspectives together. i.e. take an idea into action alongside managing the human interaction within the project and with the outside stakeholders, defining and realizing the meaning of the project success with all the different conflicting interest from the stakeholders, looking at the project within the business context and understand the

relation between its outcome and the new product development in the innovation cycles, and finally making sure that we are able to adapt to the different context and changing environment while still being able to stick to the project baseline.

CHAPTER 2

RESEARCH FRAMEWORK & METHODOLOGY

2.1 Towards Theoretical Model: Conceptual Frameworks

Innovation Conceptual Definition

Conceptually, Innovation is the creation of something both novel and helpful. It can be a new product, a new service, a new process, a new model, or a new way of organizing. Whatever form innovation takes, people often think of it as a chance occurrence, a brainstorm by one of those rare individuals who are creative, but the actual process of innovation is more complex. (Hill, Brandeau, Truelove, and Lineback, 2014).

The industrial innovation was further explained as the formation of the technical, design, manufacturing, planning, and commercial tasks involved in the marketing of a new or enhanced process or product (Freeman, 1974). The mention of the words “new or improved” process or products in Freeman’s innovation definition triggered the thought that innovations are different in nature, some are revolutionary, i.e. of breakthrough ideas that change industries. e.g., use of laser technology in surgery, and other innovations that are evolutionary, which takes existing concepts and evolve them into newly enhanced concepts (Myers & Marquis, 1969). e.g., the use of Smart TVs as an evolution from the tablet development.

Key innovation management perspectives have been studied and analyzed. Perspectives were broken down into four areas based on their key attributes and features within organizations. The first is being institutional that focuses on the internal conditions, which can influence the management of innovation. The fashion perspective that focuses on the influence of new management ideas and concepts to innovation management. The cultural perspectives zoom into how inter-organizational culture could motivate innovation management. And finally, the rational perspective that is closest to this research work argues the role and interactivity between the invention and implementation within the same organization (Birkinshaw, Hamel, and Mol, 2008).

The study has also proposed an interesting innovation management process, which begins with the motivational phase of the organization whereby changes perceived in the environment, followed by the invention, then implementation phases, and finally by retention (Theorization and labelling).

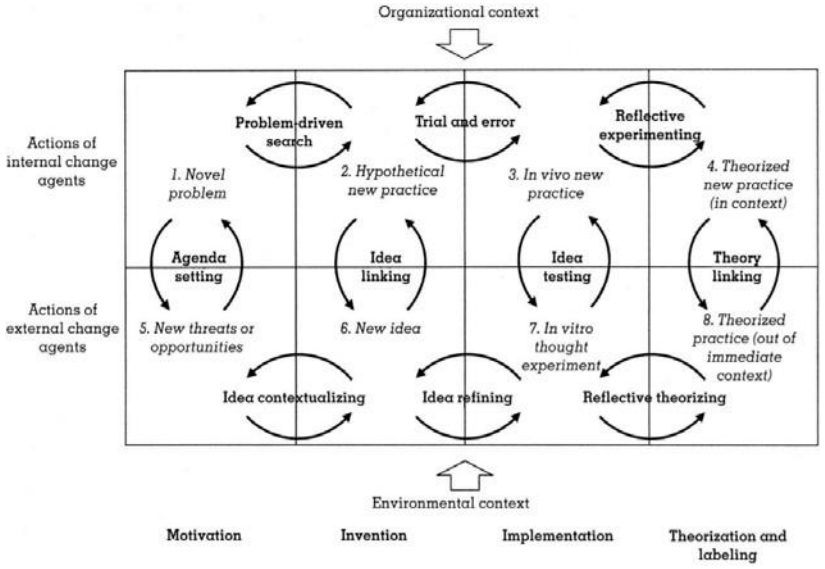


Figure 32: Management Innovation Process Framework

Source: Birkinshaw, Hamel, & Mol. 2008, p.8

Innovation processes were also broken down into phases using design thinking to argue the innovation process in the learning context (Beckman & Barry, 2007). The model is relevant to our study as it uses two particular approaches to defining the innovation processes, one using storytelling with the starting phase of observations to create a rationale for why this is important, then the imperatives phase when the story is about showing what could be new. The third and fourth phases of this model is where our research is more focused about i.e. what happens after the idea has been identified. In the storytelling phases, they are generally referred to as the imperatives and solution phases that are when we ask the question of show us the opportunity and make it happen. The same phases are used in the problem solving and solution finding modes, where the first two phases of this module are used for the problem finding and selection, while the last two phases are utilized for solution finding and selecting. The model doesn't detail the exact steps and processes to make it happen, but it at least put an emphasis that it should be considered as part of the innovation processes, this is illustrated in (Figure 33).

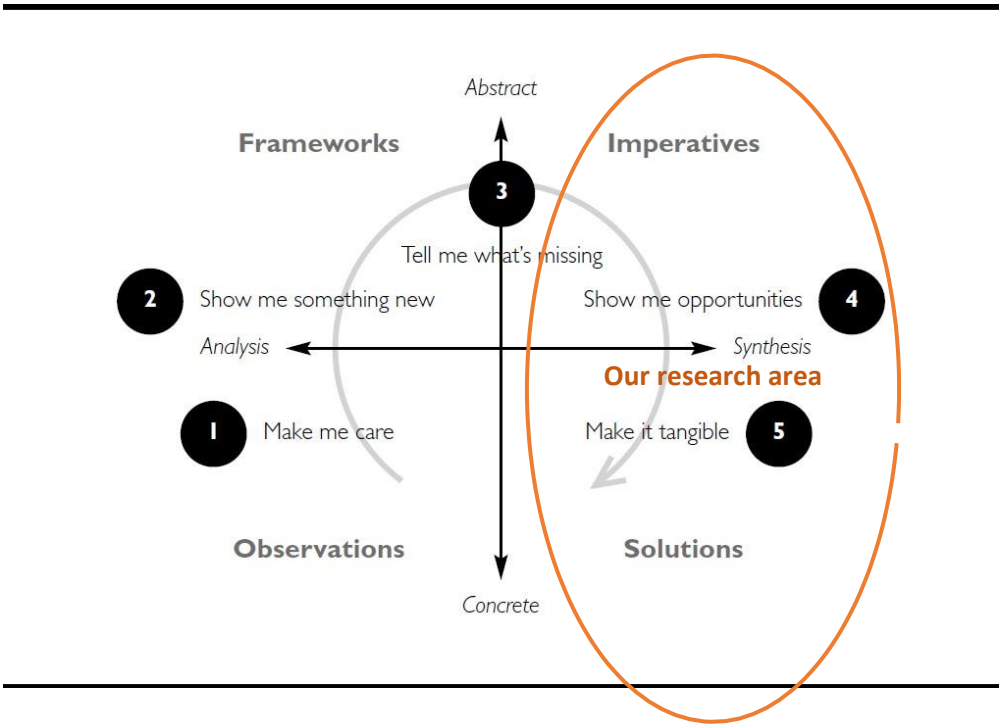


Figure 33: The Innovation Process as Story-Telling
Source: Beckman & Barry, 2007, p.7

Project Conceptual Definition

At the highest conceptual level, looking at the basic definitions of the term "project," the Oxford English dictionary defines the word as something thrown forth or out; an idea or concept. It also defines it as a mental conception, idea or notion. And in construction at the pre-model period, the project was intended to anticipate the future object. It's been recently described by the global community of project practitioners and professionals as a temporary endeavor undertaken to create a unique product, service or result (PMI, 2004).

Projects management, as a formal management approach, has origins in industries such as aerospace and defence. And although some traditional tools and techniques are

closely associated with project management, such as work breakdown structure, networks, critical path method, cost and schedule tracking, it has been expanded from the fields of operations management and engineering. Recognizing that there is still argument about the span of project management as abroad management approach rather than an execution—only discipline (Morris 1994, 2009).

Therefore, the starting point of this study is with some keywords spotted in the above-mentioned conceptual definitions such as “Create,” “Unique,” “Idea,” “Concept,” and “future object.” These words in many project definitions illustrate the quest for creativity, future and forward thinking that are required for each project activity in order to come up with something new such as an idea, product, service or result, also to be considered as unique (and not repetitive/operational) in nature. Theoretically speaking, the project management perspectives (Turner et al., 2010) and the nine perspectives represent an excellent theoretical foundation on projects, especially the project business success, contingency, and the people factor.

Innovation to Project Theoretical Framework

Conceptually, the simple thought of innovating something new is somehow linked to what projects are intended for that’s creating something unique. Both are intended to the basic idea of development (Brady & Hobday, 2012). Innovation and change in organizations are often reliant on projects, one-time initiatives to launch new products, and new processes. The project could be argued as the means by which innovation takes place. Therefore, projects are a key way of organizing innovation and the innovation is a major

output of certain kinds of projects. By the same token, projects could be managed differently based on their initial intent, so innovation can trigger a change to the way projects are being managed in comparison to the traditional way of managing projects, which are generally very well scoped and defined right at the project initiation phase.

According to the aforesaid defined innovation generations, it is likely that the first generation of R&D push model is associated with the defence projects, due to the required science push version of innovation. As the use of projects spreads from the military into business, more attention started to be paid to customers under the name of a market pull model. However, the second and third generation innovation models have not affected project management's approaches largely.

The fourth-generation model of innovation made a major development in project management practices. The high levels of cross-functional integration in this model led to the emergence of different models of project organization such as matrix management and the emergence of different leadership requirements for project teams.

Although it's going to be a challenging objective to advance this area, it can be seen as a potential unique angle to further examine the relationship and links between innovation cycles and project management. The integration between project management and innovation research is very limited, opening the door for more research work to be done to examine a stronger link between the two areas (Brady & Hobday, 2012).

More recently, research in this relationship started to attract more attention, by questioning the value and relevance of the traditional project management processes to achieve exploratory missions in organizations (Lenfle, 2014), which offered a starting point for arguing for alternative ways to manage projects that are aimed at innovation. However, the study didn't pinpoint a clear model that can be practically used by organizations.

The latest research in 2016 about this relationship used some elements that my research proposal suggested back in 2014 that is to use design thinking within projects context in order to foster innovation (Jouini, Midler, & Silberzahn, 2016) yet again while it highlighted the interaction, it didn't offer a specific management tool or model to bridge between the two areas.

Some of the common design thinking tools and the task they achieve (Liedtka, 2014), which we think could benefit the potential integration between projects and innovation, includes: visualization such as the use of charts and graphs and storytelling, observing and deep understanding the users, organized collaboration such as brainstorming and mind mapping, creating and agreed assumptions, and finally prototyping by making the ideas more tangible, and piloting through field experimentation with the stakeholders.

2.2 Proposed Theoretical Framework (PRO-INNOVA)

The literature review revealed little or limited studies conducted to study the interaction between innovation and projects, the integration between the two variables is very limited (Brady & Hobday, 2012), opening the door for more research work to be done

to examine a stronger link between the two areas. Most of the attempts were also focused either only in one sector that is technology, leaving room for exploring the interrelation between the two areas in other sectors. Or they were generic to draw from them some practical application for organizations.

The new theoretical framework proposed here is attempting to create a comprehensive purpose-to-impact cycle merging between some of the innovation and the project phases and activities, referred to here as “Pro-Innova” for short. The research argues, validate and propose this new theoretical model, using some aspects of the system dynamics loops to move away from the waterfall sequential process blocks that could limit our ability to imagine and paint a new framework of project collaboration through the use of process ontology (Chia, 1997; Rescher, 2012).

We propose this new conceptual framework that integrates the innovation and project management activities, using some aspects of the design thinking and the system dynamics loops with focus on the complementary and common aspects found in both areas to address the challenges, limitations and contradictory as well as the complexity each area (Innovation and Project) has on its own. Therefore, attempting to create an end-to-end practical ideation-to-realization with sustainable impact cycle, which could benefit organizations (Private, public or social) globally with the repetitive cases of dry innovation and project delivery challenges.

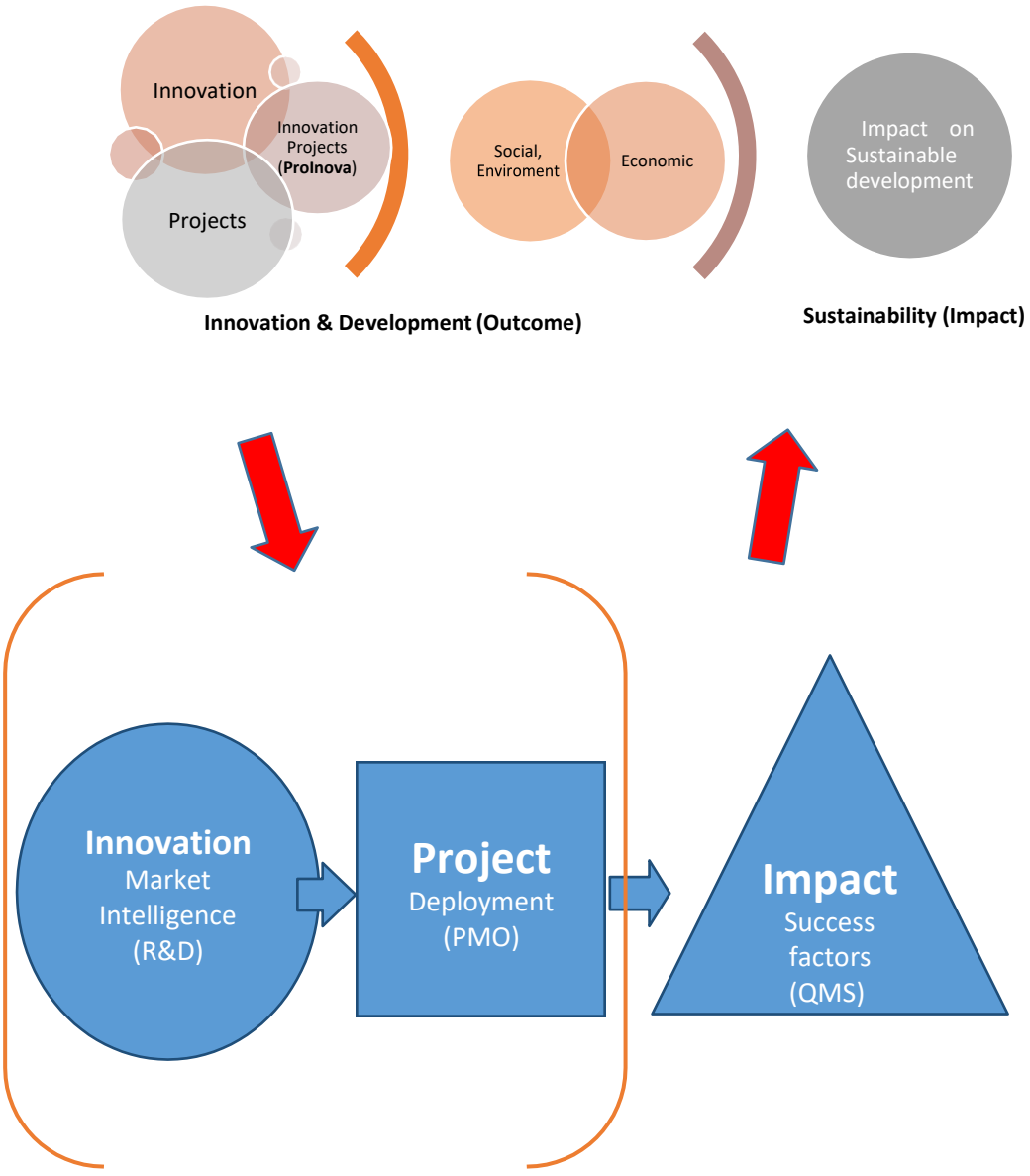


Figure 34: Theoretical Framework
Source: Researcher's illustration

This proposed theoretical framework (Pro-Innova) hypothesizes that projects that are aimed for innovation need to be conceptualized and managed differently from traditional projects. The ultimate objective here is to try improving the innovation

realization as well as increase projects' rate of delivery success. The integration between both areas is therefore needed in the context of modern management.

Initially, the Pro-Innova framework proposes to start including **the innovation's ideation phase**, borrowed from the innovation processes (Desouza, Dombrowski, Awazu, Baloh, Papagari, Jha, & Kim, 2009) as the independent variable of the Pro-Innova framework, to become the new starting point for any project that intends for major innovation, starting the project with the traditional planning, scheduling, and controlling sequential activities (Lewis, 2001; Söderlund, 2002), which historically came after the ideation and market study/business case phases had been already finalized. Traditionally, projects start after the market research and ideation activities, causing a major disconnect between what was intended and what is finally delivered hence impacting new ideas to become reality as well as project's success in the more general term (Heising, 2012).

The other new addition in this model is to add the **project's implementation phase** (Dependent variable of the Pro-Innova framework) to be linked to the starting innovation's ideation phase, which traditionally lacked this integration and often stopped at the R&D and market intelligence and scanning stages.

This addition allows the ideation and implementation to work together from the start to the end of the cycle, hence motivate the project to achieve the intended goals (Since it is now starting to be involved from the ideation phase, hence better understand the rationale and intention for the project). It also allows the innovation (R&D) to act as an internal

sponsor for the project implementation since it is now a connected phase within the innovation grand and extended cycle.

Lastly, the Pro-Innova model suggests the closure of the project is for the **impact assessment** of the final deliverable, and not the traditional project closure phase. This way the innovation project work is assessed based on the impact of the idea and not just the project short-term outputs (Matta, Ashkenas, 2003) as in the time and cost performance indicators at the traditional project deployment stages.

At the conceptual level, to test the level of contribution the Pro-Innova activities, outputs and purpose has on strategic goals, the Theory of Change (Brest, 2010) is applied as a logic frame. The theory of change is a helpful tool for analyzing the design, delivery, results and potential impact of Pro-Innova. It provides a realistic way to address causality, i.e., how a cause leads to an effect, by recognizing that in the real world, multiple factors influence a result. Additionally, Pro-Innova is also linked to the Success Criteria model (Turner et al. 2010) which assesses the success of Pro-Innova based on the view of the various stakeholder groups (e.g., team, organization, external parties & beneficiaries) who are interested by the Pro-Innova output and influential to its outcome and impact. The success criteria framework is particularly important due to the fact it looks at success in three different horizons: 1) Short-term (Output) 2) Med-term (Outcome), and 3) Long-term (Impact). Pro-Innova places the theory of change (ToC) and success criteria (SC) frameworks into practice to evaluate two Pro-Innova variables.

This said we shouldn't underestimate the theoretical and practical difficulty in integrating these **two complex areas** "Innovation & Projects" (If we are also to exclude the third area "Impact"). Projects are cooperation structure, in achieving some kind of common operation through the association of a number of actors for a common goal. The problem of coordination attracts attention to different kinds of challenges, which are dealt with by the use of classic coordination mechanisms (Van de Ven, Delbecq, & Koenig, 1976).

Although we may think of the project as knowledge collectivities (Lindkvist, 2005; Ahern et al., 2014), this does not mean that all projects are seen as being similar. It, therefore, requires implementing a version of contingency model into it. Shenhar and Dvir (2007) argued that to study different types of projects and various solutions to the coordination problem, the key fact is "Contingency Factors": Uncertainty (driven by the market and technological changes), Complexity, and Pace.

And in order to address this complexity, we are considering, "Designed Thinking." Designers have traditionally focused on creating or enhancing the integration between idea and implementation. Recently, they have begun using design techniques to deal with more complex problems. As an approach, the design thinking analyzes capacities we all have, but that are overlooked by more conventional problem-solving practices. Not only does it focus on creating products and services that are human-focused, but the process itself is also human oriented.

The approach relies on our ability to be intuitive, to recognize patterns, to create ideas that have emotional meaning as well as being functional, and to express ourselves in media other than words or symbols. Having said that, it is clear that nobody wants to base an organization on feeling, intuition, and inspiration, but an over-reliance on the rational and the analytical can be just as risky. The integrated approach at the core of the design thinking process could provide a third way (Brown & Katz, 2009).

In our research context and more specific to the Pro-Innova framework, design thinking can be assembled by using some of the nine project perspectives specific to this research question, namely the ones we have described at the project conceptual & theoretical definition section: Human, Success, Business and Contingency factors (Turner et al. 2010).

This new theoretical framework (Pro-Innova) analyzes and considers the role of the complexity in the integrated system. Addressing the question of how a single project could incorporate several project perspectives all at the same time, in order to take an idea into action alongside managing the very often unpredictable human factor within the project and outside stakeholders. Defining and realizing the meaning of the project success with all the different conflicting interest from the various stakeholders. All while looking at the project within the business context and understand the relation between its outcome (The new product development) in the innovation cycles. And finally, making sure that it is adaptive to the different context and changing environment, at the same time, still being able to stick to the project baseline.

Our second idea is to borrow and explore the good engineering concept of system dynamics (Forrester, 1994) to help understand those different interactions and dynamics between the different perspectives to create an end-to-end cycle with linked loops starting from ideation to the final impact, passing through the implementation factory.

Table 4: Pro-Innova 4-perspective system dynamics matrix

Human	Success	Business	Contingency
Examples: Sponsor (High interest—High Influence)	Outcome: financial value of the new product	New Product development	Customer feedback
Government (High influence—Medium interest)	Impact: Socio-Economic value	Sustained Development	Regulatory requirements

Finally, to visualize the proposed theoretical and conceptual Pro-Innova framework. Illustrating the adaptability and system dynamic interaction between the research model and the 4 perspectives (above table) to have the general idea of the overall scope of the Pro-Innova framework.

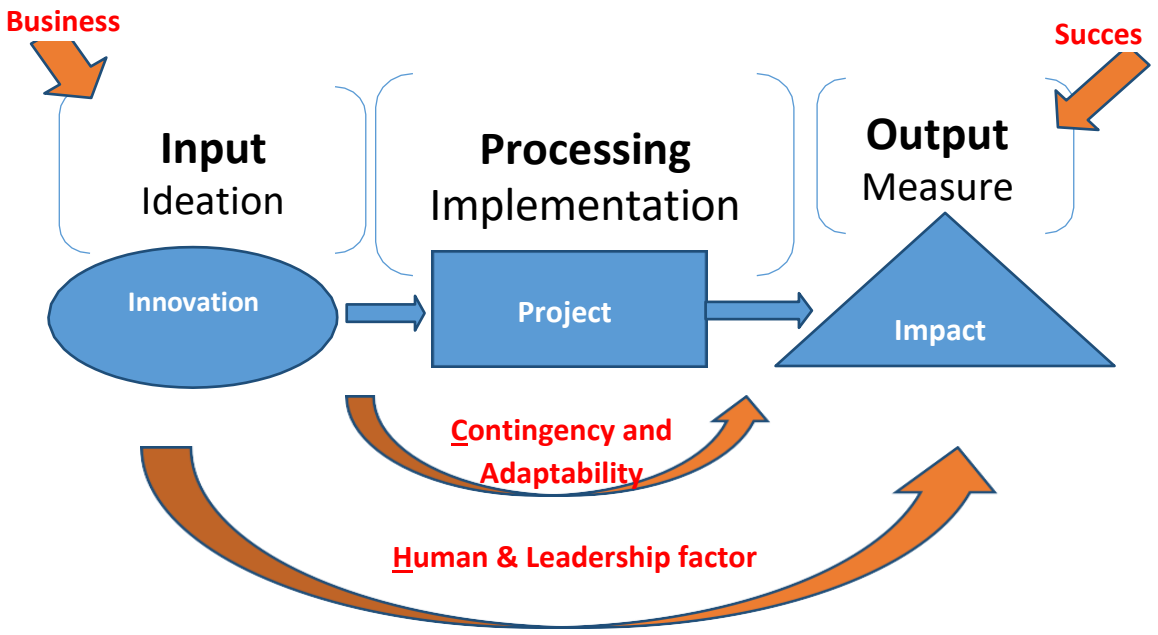


Figure 35: Pro-Innova Adaptive System & 4-Perspectives
Source: Researcher's illustration

As a concluding remark to this section, this proposed conceptual framework (Pro-Innova) is purely theoretical and we will be using some blended research methods to test its proposed hypothesis, including in the two case studies from the aviation industry and standard development. Consequently, we could potentially validate and help further define the detailed structure, processes, roles and systems forming a more practical working model, which expands from the Pro-Innova theoretical framework into a new management system.

Research Variables

In order to evaluate the research question of the relationship between innovation and projects, it will be important to define the key independent and dependent variables that form the basic shape of the proposed theoretical model and could be used to measure

the interactivity between its variables (Cramer & Howitt 2004) using the suggested blended qualitative and quantitative research methodologies.

We propose the independent variable of the proposed theoretical model is innovation, more specifically the ideation activity within innovation, which referred to as the invention in some research work (Birkinshaw et al., 2008). We define the innovation's ideation within this research as a new concept or idea for product or service that is either evolutionary or revolutionary in nature.

The innovation's ideation independent variable is driven from the form micro activity such as market intelligence, customers and value chain collaboration conducted at the research and development area of the organization as well as the macro social and economic development, which influences this variable. However, our research is focused on when the ideation i.e. new concept has been already identified, and when organizations are starting to be concerned about how to validate, test and actualize the new concept.

This independent variable is argued to trigger a change in the other dependent variable of the proposed theoretical model. The main dependent variable studied in this research is a project and more specifically the implementation activity defined based on the literature review as the work done from the planning to the execution and deployment of the new concept, which is happening at the project management unit within an organization. This is shown in (Figure36).

The independent variable that is “innovation’s ideation” is argued in this research and proposed framework to cause a change in the independent variable that is “project’s implementation.” And while project’s implementation could enhance the ability for innovation’s ideation to be realized, the research argues that this dependent variable has little or no impact on the innovation’s ideation activity itself (Fan, Shihe, 2010), which is highly dependent on other key factors such as market conditions, technological and social advancement, and others which are outside the scope of the model and this research.

The nature of changing the innovation’s ideation independent variable causes in the project’s implementation dependent variable can be practically explained in the way it could possibly cause changes to the traditional way of managing the traditional waterfall project phases and methodology in an organization. Therefore, it changes and proposes new ways i.e. processes, roles and responsibilities, systems, and structure for firms (In either a private, public or social sectors) to manage its innovation projects (Pro-Innova theoretical framework). This new way of managing the linkage between the independent and dependent variables are further assessed to form a new practical management model.

Finally, the interaction between the independent and the independent variable “Innovation-project” could also result in a third dependent variable that is impacted. However, for practical reasons, this research will narrow its scope to study the first two relationships (Innovation to projects) and while we will try to propose a new way to assess impact in these innovation project types through studying their success factors and the

Socio-economic benefits, the third dependent variable will be considered out of this research scope for further analysis in future research work and papers.

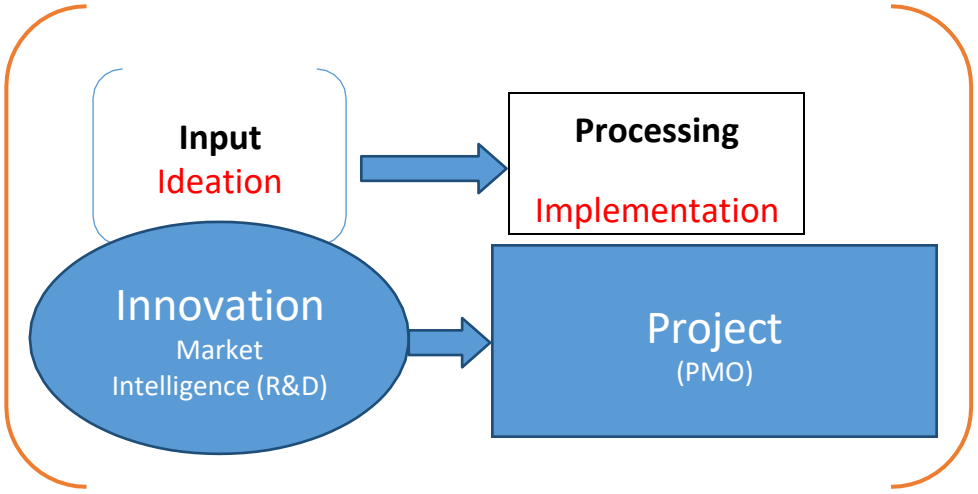


Figure 36: Research Variables
Source: Researcher's illustration

Research Originality

Project Management beyond the "one degree":

As discussed in the literature review section, research in the project management area started much later than when the concept of "project" was first used by some ancient civilizations. It was only in the 2nd half of the twentieth century when Paul Gaddis described for the first time in a Harvard Business Review article the role of the Project Manager in organizations. This relatively recent research apatite toward this important area (Compared to other management disciplines such as marketing, finance … etc.) illustrates the need for further research to unleash some of the secrets the project management discipline still holds.

Additionally, the history of project management models, which as per Navarre started with the "minus one" degree, followed by the degree "zero," and finally with the degree "one" when the profession started to compete with the research in this domain, makes the research in this area to discover what could be (following Navarre categorizations) a degree "two and maybe three" when the researcher and profession objectives meet, and start collaborate (instead of competing) to advance the project management discipline. An objective this study will attempt to achieve from this PhD research in Project Management.

Innovation Projects with Impact model—Pro-Innova:

With considering all the above, there is a possible unique angle to research about the concept that we can call here "Innovation Projects with Impact," which aims to go beyond the current project management level one degree in research, advancing the fifth—generation in innovation models by exploring the integration between the two concepts (Project & innovation management), benefiting from but going a little bit beyond the research work that has been done in "business projects" and "Product-development projects" (Artto, Wikstrom, 2005) and most recently by (Thomas, Cicmil, & George, 2012), by researching the "innovation projects" in a more practical way to demonstrate visible impact.

The above examination to a possible further integration between the project and innovation management will lead the examination to the organizational set-up of both areas

by evaluating how the Project Management Office (PMO) could potentially play a role in the R&D organizational structure within companies, industries and countries.

2.3 Research Methodology

The proposed conceptual framework (Pro-Innova) is theoretical in nature and used some mix research methods to test its suggested hypothesis, including a qualitative literature reviews, some semi-structured interviews, and ethnographically observed case studies from being in the field of several sectors including the aviation industry and standard development area.

Quantitatively, a survey was also conducted to further validate the interview and case study observations. Consequently, we could validate and help further define the detailed structure, processes, roles, and systems that shape a more practical working model, which expands from the Pro-Innova theoretical framework into a new pragmatic management system (Prod-Ject).

This research variables and proposed theoretical concepts were mostly driven from the notion that it should ultimately create relevance to the field of practice (Blomquist et al., 2010) hence, the practical management system came to test the viability and practicality of the proposed theory in an attempt to bridge between the current gap being observed between management theories and the field management practice (Mintzberg, 2003). This gap is even more apparent in the field of project research with the ongoing tension between the practitioner's point of view on what a best practice and consequently the creation of

body of knowledge for project management versus the project research and theories (Cicmil & Hodgson 2006).

The research took a brief view on top-down traditional system on how rational structures in projects and in innovations and how best they could be managed (Andersen, 2006); (Dvir and Lechle, 2004); (Pinto and Slevin, 1989), nonetheless the main focus of the research was on the process by studying the past, present and future of how the projects and innovations processes relate to the entire organizational structure (Legris and Collerette, 2006); (Lindkvist et al., 1998); (Lundin and Söderholm, 1995); (Sutterfield et al., 2006) with a special attention to the practice by relating the process through the bottom-up identification of a local situated actions (Hällgren and Wilson, 2007); (Hodgson, 2004); (Simon, 2006).

Overall, paradigm belief theory (Guba & Lincoln, 1994) and constructivism discipline are guiding this research work, assuming that there isn't just one-way of the truth as it is relative and highly dependent to its context, opening the concept for interpretations. This belief allowed for us to freely study the nature of the relationship between two traditionally different areas of research (Project & Innovation). It also permitted for the proposed concepts and models to be open, adaptive and contextual to the type of work and industry the reader may belong to. The human creation is important in this research and allows for an interactivity between the research and the case participants without any manipulation to the facts of the story.

In order to assess the validity of the hypothesis and the proposed new theoretical framework (Pro-Innova) as well as reveal the details of a possible new management system, a blended research method was used, comprising of qualitative and quantitative approaches. More specifically; addressing the research question on why and how innovation and projects are related, and whether there are visible linkages, assessing the interaction between the Pro-Innova independent variable (Innovation's ideation) and dependent variable (Project's implementation) and validating the practicality of a new management system (processes, roles, structure, and system).

The use an international multi-sector/country survey using an online questionnaire to validate the observation made from the interviews and case studies and to assess the viability of the proposed conceptual model in the workplace. The questionnaire was targeted to leaders and professionals who led and participated in projects and innovation from a broad range of industries, and from several countries around the world.

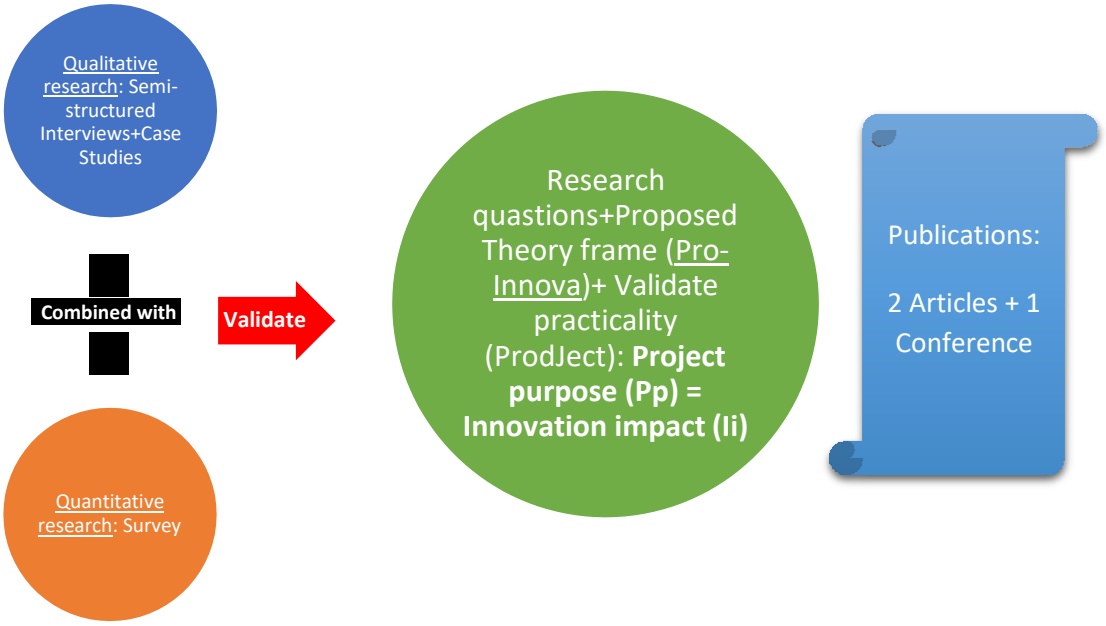


Figure 37: Research Methodology
Source: Researcher's illustration

The outcome of the qualitative and quantitative research tools was published in two separate articles at the Journal of Modern Project Management, an international double—blind reviewed academic scientific journal with editorial committee members, and authors from UQAM, MIT, CERN and other major Canadian and international universities and research centres.

The first article focused on the theoretical aspect of the proposed model (Pro-Innova) using literature review as the prime method in the article. While the second article looked at the practical project to product management system (Prod-Ject) building on the first article (Pro-Innova) literature review with combining the semi-structured interviews and survey empirical results.

Thirdly, the research was recently accepted by the reviewers in a double-blind review process at the International Journal of Arts and Science which is hosted by McGill University in June 2019. The presentation at this conference will showcase how the theoretical model (Pro-Innova) and the practical management system (Prod-Ject) can be used by real organizations using the ethnographical case studies of the research, and arguing that Projects with purpose (Pp.) would result (=) in Innovations that impact (Ii.).

Qualitative: Multiple Case Studies & Semi-Structured Interviews

Ethnographic research was applied by the researcher who has spent most of his career (+15 years) working in several countries (5 countries) and international organizations (4 organizations) that continuously faced innovation and project management challenges, where he was (and still is) interacting and observing real managers and CEOs struggling between the two studied areas (Innovations & Projects) within their daily professional life. The case studies were therefore mirroring real companies that were observed during the ethnographic study.

Harvard Business Review has issued a dedicated study in 2009 to underpin the importance and strength of the ethnographic research - being holistic and research open - compared to traditional market research that is often directed and narrow-angled in research terms. This strength in ethnographic research has made global companies like Intel to dedicate resources and attention to develop its internal capability in using this type of research in order to allow Intel unleash its own and the overall market potential (Anderson, 2009).

Therefore, the researcher compiled his reflections from the ethnographic observations and author a multiple armchair case studies similar to the approach used in case development by major academic institutions such as in the case of Harvard Business School, with the objective is to review the challenges the organizations are facing and the complexity that comes with it, while preventing any organization from being exposed with their members or stakeholders (Harvard Business School, 2017).

The multi-case study approach allowed for exploring the research question from different angles as opposed to one lens of research (Stake, 1995; Yin, 2003). This research question on why and how innovation and projects are related, and whether the linkage (if any) creates a long-term sustainable impact on societies and economies were carefully analyzed throughout the case studies where the researcher reflects his views based on the phenomenon he has observed.

Each case has the following core components; firstly, armchair contextual case description and challenges based on the researcher industry experiences, observations and interventions. Secondly, neutral third-party assessment of the case and proposed solution through an industry-academic case competition. Thirdly, semi-conducted interview with people work in similar organization to the case studies in order to assess the practicality and application.

The Semi-structured interview method was used to assess the applicability of the proposed theoretical model and practical management system in the case-study

organization. The questions were mostly open-ended to allow the interviewees to provide wide and specific perspective. This method allowed for a direct interaction between the researcher and the research object variables (Aubry & Hobbs, 2011).

The semi-structured interview was designed with respecting the ethics and key principles of interviewing that are to keep an open dialogue while avoid leading the interviewer into the desired answers (Zorn, 2008) as well as consenting and make the identity of the interviews participants anonymous.

Finally, as far as the case study academic competition, the two case studies are accepted by KGP Award Event (A research challenge event organized by PMI, UQAM-ESG, and other industry partners) to validate the two case studies challenges and their findings, participants were some key university professors, students, and industry professionals who are involved in the project management area. Some universities included McGill, University of Vermont, UQAM, HEC Montreal, Concordia, UQO, UQAR, University of Sherbrook and others.

Case Studies

The two armchair cases were selected and authored based on 1) industries where they have been categorized as both low-innovation or law-project intensive industries, and 2) industries where the researcher has spent (and is still spending) time working and observing (Ethnography). The first case study is in the air transportation sector where innovation is lagging behind other sectors such as IT & pharma while project management is

quite developed. While the second case study organization is in the standardization sector where innovation and intellectual capability are quite advanced and project management is at low maturity level. Therefore, there are quite complementary and diverse aspects in the two cases (The first is technological innovation project while the second is social innovation project) to allow for a wider review and potential application to several players within the studied sectors and beyond.

First Case Study— The Air Transportation Industry—Innovation Projects Challenge (Technology Innovation Project)

Air transportation/aviation is a very interesting and dynamic industry as it somehow sits in the intersection between several other industries such as tourism, supply chain, pharmaceuticals, agriculture … etc. While also connects between the micro and macro-economic activities through the direct impact of goods and business travellers transported by air on the economies, which is a strong economic indicator for the country export and import activities and overall financial health.

The industry and its key players from airlines, airports, to aircraft manufacturers are also volatile to social and geopolitical phenomena. Sanctions are often launched against transporting passengers and goods through air transportation to and from the country in question, and air defence has a big overlap with civil aviation when it comes to regulation and flying rights.

The above reality combined with the fact that the industry is suffering from one of the lowest economic performance compared to other industries, and therefore one of the lowest rates of investment in R&D while being described as a fast changing and agile industry are the key ingredients for making us study this particular industry.

Second Case Study–Trade, Standard & Quality Organization–A Project Management Challenge (Social Innovation Project)

The standard development sector is another intriguing yet completely different from the case we study in aviation. Unlike aviation that is vertical in nature representing one industry value chain, the standard development sector is a multi-industry horizontal sector. It is often bridges between the players of the public and private sectors as it helps in the efficiency as well as quality control aspects.

The sector is also very rich with innovation due to the fact that experts from all sectors and regions gather to formulate a standard way of doing things, therefore there is a massive amount of a collective brainstorming and intellectual capital that exists in this sector. However, it simply lacks agility with generally a very slow base from the time a standard proposal is submitted till the time it is published for wider public and private sector use. Finally, this sector is extremely under researched making it an additional reason for reviewing in this study.

Case Observations—Third Party Case Assessment

The two case studies and their findings were presented for further validation through a continuum of combined structured and unstructured review (Newton, 2010) with key university professors, industry professionals, and students who are involved in the project management area. The two-case study and findings have been recently selected by KGP Award Event (http://concourskgp.ca/en/), a project management problem solving and research challenge organized by PMI, UQAM-ESG, and other industry partners to validate the two case studies and their findings, participants came from.

Figure 38: UQAM & PMI KGP Competition & Award Event, (2016)
Source: UQAM website

Fifteen Canadian and International Universities including McGill, University of Vermont, UQAM, HEC Montreal, Concordia, UQO, UQAR, University of Sherbrook and others, with professors, and students in the Bachelor and Master levels. Three hundred

industry and academic participant and +120 contestants with project management study and work background.

Each university group studied the two case studies and answered some structured questions and presented additional suggestions about the cases and their findings. Judges from industry and academia reviewed and evaluated each of the group recommendation and ranked them for the award purposes. Here are some of the structured and unstructured questions that were asked of each working group to further study the research question and variables. The questions were related to the first and second case study, which the judges rated and commented on.

First Case Study Questions: Open question (Contestants understanding)

Based on your understanding of the case and experience of one project management methodology (e.g. PMI, Prince 2, or ISO), please propose new phases to be added to the traditional project phases in order to help NATA increases its innovation projects and their impact on the industry. You can draw a diagram and describe it accordingly. If you think differently, please elaborate

Structured Questions (Contestants' understanding and evaluation of researcher interventions) The new CEO and his management team have contracted with a major consulting firm to propose new ways for NATA to be most effective in driving innovation projects for the industry across the country by enhancing the organization ability to innovate

effectively (Creating value) for the air transport sector while strengthening the current project delivery capability. The consulting firm proposed the following interventions. Please indicate and expand by supporting arguments, which one of them you think will be the most effective for NATA.

Second Case Study Questions: Open question (Contestants understanding)

Based on your case reading and project management prior learning and experiences, please suggest a project implementation methodology allow for the GSQO Industries Technical Committee (GSQO-TCs) to shorten its current standard development cycle that is currently averaged at about 36 months while still maintaining its current principle of stakeholders' consensus and approval.

Structured Questions (Contestants' understanding and evaluation of researcher interventions) GSQO has recently published one approved industry standards in Occupational Health & Safety. What would be your proposed project structure and process to help GSQO and the respective members' and industries to effectively introduce and rollout this standard and how will you assess its success? The final result of the event including analyzing the key trends from the contestants and their unique insights as well as the judges' rating are included in the finding section.

Semi-conducted Interviews

This method was used to assess the applicability of the proposed theoretical model (Pro-Innova) and reveal the details of any new practical management system within the two

organizations. The questions were open needed to allow the interviewees to provide wide and specific perspective. The five persons who were interviewed were selected from those who responded to the survey questions, as a way to have more than one chance to interview them and elaborate on some of their answers as well as to assess the applicability of the proposed model for them (Cohen, & Crabtree, 2006). They were also professionals from companies (worked with international stakeholders in the project and/or innovation management areas) which was similar in nature from the case studies, with the objective to get their insights on the validity and applicability of the research proposed model in their daily work.

The interview questions were, therefore, primarily focused on application and less on the exploratory part that was used in the survey and case study observation. The semi-structured interview guide was designed with respecting the ethics and key principles of interviewing that are to keep an open dialogue while avoid leading the interviewer into the desired answers (Zorn, 2008). Here are some of the main questions, noting that the conversations were self-guided and flew in a seamless manner. The answers were minuted and summarized in the finding section.

Five groups of questions (Each with sub-questions) in order to validate Pro-Innova conceptual model variables and unleash a new practical management system; firstly, questions about the interviewee perception of the industry and organization key challenges i.e. from your work experience in the industry, what are some of the key challenges it currently faces? Same question about their company challenges (This generic question is to

confirm [or not] this research stated challenges that were observed). Secondly, questions about the current processes and activities with relation to innovation e.g. what does their organization do create new value (products & services) for its members in the industry? Further follow-up questions were posed to detail their processes, roles, systems and structure (These set of questions are to assess the first Pro-Innova independent variable "Innovation ideation" process and spot any linkages it currently has with the dependent variable "project implementation". This question assesses the possibility for a new management system with the process phases, roles, structure, and systems are relevant/or not. Especially the conception, and analysis phases/variables of the system. Thirdly, questions about the current processes and activities with relation to project e.g. what does the organization do deliver value (projects & programs) for its members in the industry? Further follow-up questions were asked to detail their processes, roles, systems and structure (These set of questions are to assess the first Pro-Innova dependent variable "project implementation" process and spot any linkages it currently has with the independent variable "innovation ideation". This question also evaluates if there is a possibility for a new management system with the process phases, roles, structure, and systems are relevant/or not. Especially the design & development and deployment phases/variables of the new system. Fourthly, questions about the interviewee's view on how best to address and improve the issue of creating value and delivering it to their industry members and stakeholders e.g. what in your view would be the best working model to improve the innovation and project delivery in the organization for its industry stakeholders and members? This question was followed by questions to detail the ideal processes, roles,

structure, and systems. These set of questions is meant to validate if the Pro-Innova innovation to project integration conceptual model as well as the possibility for a new practical management system. Final questions were asked about the impact assessment e.g. and so in your organizational case, how would you define if the innovation is successful? And similarly, what makes a project successful or not in your view. These questions helped us understand the boundary and end phase for the proposed conceptual and practical model i.e. do we close the innovation project at the traditional project closure phase or at the impact level.

Quantitative: Survey

International multi-sector survey using an online questionnaire to validate the research question and the proposed conceptual model variables as well as the practicality of the proposed management system was designed in a multi-rating and open-feedback survey format, which was primarily targeting scholars and professionals who led and participated in projects and innovation from a wide range of industries, and countries around the world.

The survey was designed to be exploratory in nature since the research problem was not studied thoroughly in the past. Therefore, it will offer additional insights - and not conclusions - to what was observed in the field case study and semi-structured interviews. The questions were designed to tackle issues related to the research hypothesis, namely to understand organizational key modern management challenges, to assess the relationship between innovation and projects and proposed model variables, to evaluate the proposed

model in more practical details from processes, organization, roles and responsibilities, finally, to understand and define success in innovation projects.

Participants were selected based on the following criteria in order to add value to the research questions to validate the proposed theoretical model variables and assess the practicality of the suggested management system such as scholar, professional or management role in either small, medium or large sized organization to be able to reflect the reality of modern organizations. Secondly, sufficient knowledge and exposure to the area of project management and/or innovation in order to be able to understand and contribute to the different model variables. Thirdly, diversity in the participants from the public, private and social sectors and in various industries in order to capture the similarity and differences across the various industries & sectors. Fourthly, diversity in the participants' gender, country & region of the world to address the point of gender, cultural and regional variation.

The questions have been tested and standardized to tackle issues related to the research hypothesis are to understand organizational key modern management challenges, to assess the relationship between innovation and projects and Pro-Innova variables (Ideation & Implementation), to evaluate the possibility to reveal a new management system with focuses on processes, organization, roles and responsibilities, and to understand and define success in innovation projects.

The questionnaire was shared with about 500 scholars & professionals with project management background from +60 countries in about 20 industry sectors. The participants

were from industries such as aviation, IT, consulting, education, food & beverages who are based in countries like Switzerland, Canada, the US, Dubai, Singapore and others where the researcher has worked and/or interacted with over the past 15 years of his professional experiences. An advertisement in the KGP event site, and on LinkedIn social media are planned to be used to reach out to relevant contacts for the online survey, which is developed using a web-tool

It was designed in three main sections, the first part is related to explaining the research aims and objectives, assuring confidentiality and requesting consent.

The second part is related to demographics to identify the respondents' experience, industry, country and others in order to allow for the variation analysis to be conducted based on sectoral or regional affiliations. The third and main section is related to assessing the proposed model variables with questions that scale from 1 (Strongly disagree) to 5 (Strongly agree).

Respondents were encouraged to be spontaneous, reflect their realities (No right or wrong answers) and be as decisive as possible. They were also given open ended commentary areas for more qualitative explanation to their quantitative rating. The survey result and full analysis are in the finding section 5.

This intentional mixed-methods research, which blends between the qualitative and quantitative research approaches were deployed in this study to increase the rigour of its

findings. Each methodology used worked to complement and not compete with the other methods, in a way it helped reveal additional insights as well as address some of the gaps and weaknesses that could have been in each method independently.

Scientific Publications: Articles and Conferences

The consequence of using rigorous mixed qualitative and quantitative methods allowed for the findings of this research to be published and accepted in scientific double—blind reviewed international journals and conferences.

The Journal of Modern Project Management (JMPM)

JMPM is an international scientific journal that is focused on the area of project management with the goal to balance between theory and practice. It encourages the transformation to the use and processes of the traditional project management practices. The JMPM editorial team composed of top-tier professors who come from reputable academic and research institutions such as MIT Sloan School of Management, Stanford University, University of Quebec in Montreal and at the Trois Rivières (UQAM, UQATR), Technical University of Denmark, Tampere University of Technology Finland, University of Cambridge, and CERN Switzerland. The journal uses a multidisciplinary peer review process to assure quality, and therefore its articles are indexed and published by Elsevier Scopus and EBSCO the largest abstract and citation databases of peer-reviewed literature.

The International Journal of Arts and Sciences' (IJAS) Conference

IJAS is an international scientific journal and conferences that are multidisciplinary that aims to bridge the research silos across academic discipline, sectors, and cultures. It focuses on the intersection between humanity, business and technology. The IJAS editorial team composed of well-established professors who come from Harvard University, MIT, University of Ottawa and University of Guelph in Canada.

IJAS' articles are indexed and accessed in WorldCat, Ulrich's serials directory, Cabell's directories of Educational Curriculum & Methods and Educational Psychology and Administration, ProQuest, Pol-On, the Polish scholarly bibliography operated by the University of Warsaw, Genamics, EBSCO, and Google Scholar.

Other Notable Contributions: European Organization for Nuclear Research (CERN) & Harvard Business Publishing (HBP)

Aspects and reflections from this research was also presented and published at both the European Organization for Nuclear Research (CERN), the European research organization that operates the largest particle physics laboratory in the world, and at Harvard Business Publishing (HBP), a full subsidiary of Harvard University, with a focus on improving business management practices through research and field practice.

CHAPTER 3

WHEN PROJECT MEETS INNOVATION: "PRO-INNOVA CONCEPTUAL MODEL"

FIRST ARTICLE:

Published in the January-April 2018 edition of the Journal of Modern Project Management, the article "When Project Meets Innovation: PRO-INNOVA Conceptual Model" (Albaidhani & Romero, 2018) was written with the primary objective to review existing literature and add a new perspective into how project management is transforming from traditional operational use into a value creation tool. This article has since been reviewed and cited by other researchers in other international scientific journals, most notably, in the Academic Design Management Conference, and its published article "Narrative Reframing on Complex Projects" by Bowman & Crawford (2018) from Gedeth Network in Spain and The University of Sydney who pointed to the article transformative view on project management from being traditionally viewed as operative into becoming creative in nature.

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Abstract: At the macro and micro levels, governments, industries, and companies are constantly challenged by their stakeholders and customers to show relevance by adding a new value with innovative services, products, and solutions. The same stakeholders are simultaneously very demanding for the agile delivery of results with a high impact. Both

competing and often contradictory demands can be challenging to be met by organizations. Innovating new and unique value often requires a different set of skill and environment (Reflective, creative process with the need for a reasonable time to experiment) than those required for delivering rapid projects (Time intensive and process-driven activity). This state of complexity is the main reason for the research study that is discussed in this article.

A proposed conceptual framework to merge between some of the innovation and the project phases referred to here as “Pro-Innova” for short. It suggests a new theoretical model that integrates the innovation and project management activities, using some aspects of the design thinking and the system dynamics loops. It focuses on the complementary and shared aspects found in both areas to address the challenges, limitations, and contradictions as well as the complexity each area (Innovation and Project) has on its own.

Keywords: *Innovation, project management, delivering results, theoretical model*

Introduction

Several researchers argued for the perspective that project management should focus on processes, modelling, and optimizations to perform control and contribute to standardization (Turner et al., 2010). This could be attributed to the influence project management had when it first started as a branch from operation research theories and therefore had some historical links to some early nineteen (1911) management science concepts during the Taylorism era which suggested human work as close as possible to machines in the factory. Looking at the project activities through the lens of processes is a way to coordinate work across functions. However, it increasingly hinders the quest for

innovation and risks the adaptability factor that is critical aspects of new management to deal with complexity and unpredictable operating environments (Rayasam, Renuka, 2008).

The definition of what is to be considered a project seems to have been widely accepted across most industry sectors and around the world, making it easier to define and process. However, the challenge with projects nowadays is that many are often failing to deliver on what all involved stakeholders would consider as a "satisfactory result." This goes beyond the traditional project definition that pays attention to the processes related to project cost, time and scope. And, on the other hand, the reasons behind the failure of many projects around the world despite the clarity in processes and definition of scope, cost, and timelines (Economist Intelligence Unit, 2009).

No one can ignore the fact that organizations today are still perplexed to put the words innovation and project in the same sentence. Innovation is often perceived within organizations as the free flow, unstructured and borderless work that requires the genius of the people involved in producing the next big idea. While the project term is still commonly perceived to a very structured and defined scope and processes that don't tolerate deviations and regularly rejects creativity that is considered, "out-of-scope." Still, the unanswered questions are:

- Why don't many innovations work to see the light (market: customers, users or citizens)? And
- why do several important projects fail? Despite the defined processes and scopes

Looking at it the other way around, what makes innovation work? And what makes the project successful? Could organizations and governments benefit from the structure of the projects to make great ideas a reality? And can the inspiration behind a great idea define and drive projects' success? We also recognize that organizations are dense with several internal and external interdependencies, objectives and goals. Within this organizational density, innovation and projects are arguably the most complex work an organization undertakes with the human factor at its highest, connected processes and networked organizational structures. Therefore exploring a relationship between these two complex undertakings will require applying simplification through an effective use of design thinking and dynamic systems to try and explain any relationship through the feedback loops and interactions.

Although it's a challenging objective to advance this area, it can be seen as a potential unique angle to further examine the relationship and links between innovation cycles and project management. The integration between project management and innovation research is very limited, opening the door for more research work to be done to examine a stronger link between the two areas (Brady & Hobday, 2012). The primary objective of this article is rethinking the traditional project management concepts by conceptualizing a new theoretical model, which brings the discipline of project management closer to the field of innovation. We argue that project is a critical enabler for the creativity to materialize and for the innovation cycle to get completed. This paper is structured in 4 sections. The first and second section describes the research context and the organization paradox related to project and innovation. The third section presents the context framework: Pro-Innova

model. And the last fourth section shows the main conclusions and some new research avenues.

1. Research context: project and innovation relation

Conceptually, the core thought of innovating something new is somehow linked to what projects are intended for that's to create something unique and not repetitive. Both are in a way used by organizations for the core idea of development (Brady & Hobday, 2012). Innovation and change in organizations are often reliant on projects, examples of one-time initiatives to launch new products or new processes. The project could be argued as the means by which innovation takes place, hence is a key way of organizing innovation.

By the same token, innovation is a major output of certain kinds of projects. And therefore projects could be managed differently based on their initial intent. The intention for innovation could trigger a change in the way projects are being managed in comparison to the traditional way of managing most of the production-type of projects, which are very well scoped and defined right at the project initiation phase.

Project managers and teams are in a continuous struggle to define their role in projects which has different intentions as many are still in the thinking that a project is a project irrespective of the context and intent. In a recent Harvard Business Review, a project manager was positioned in 4 different roles based on the degree of reliability of the business plan and the conformity to existing growth strategic plans (Pedersen & Ritter, 2017). It is the

exploration project missions when a project has no clear and define business case, with just a high-level intention for success, which is often not in conformity with existing company strategies, is the one vulnerable to failure and is, therefore, the interest of this research.

At other spectrum is innovation, the creation of something both novel and helpful that can be a new product, service, process, model, or a new way of organizing. Whatever form innovation takes, people often think of it as a chance occurrence, a brainstorm by one of those rare individuals who are creative, but the actual process of innovation is more complex than this (Hill et al., 2014). Innovation attracted more research attention compared to the project management area. The focus, however, was majorly in the technological innovation area (Brady & Hobday, 2012).

A major challenge with innovation in today's global environment remains somehow consistent with those discussed by some fathers of innovation research. Schumpeter argued that the prediction of business cycles and the success of business models are highly dependent on the model ability to predict future cycles after careful consideration of historical events and trends (1939). Similarly, Friedman argued that the solidity and reliability of a model are assessed based on its predictability factor more than its assumption. He also distinguished between new and improved innovation (Friedman, 1953). The Schumpeterian innovation emphasized the point that innovation is not just about technology, as it includes other things such as imagining new combinations of the firm resources and capabilities (Galunic & Rodan, 1996).

Innovation models started to evolve through different generations (Rothwell, 1992). And unlike projects that achieved some degree of clarity in definition and process flow, innovation lacks a precise definition and way to conceptualize, which is a leading cause for why many great ideas don't see the light of becoming a real product or service (Chunka Mui, 2012).

In between projects and innovation, as we started to analyze and closely look at their respective features, trends, benefits, and challenges. Besides the perceived contradiction described in the introduction section of this paper, we also began to detect some similarities and complementarities all at the same time, which leads us to explore further the interaction and relationship between the two areas in an attempt to contribute to solving the complexity faced by modern companies.

On the complementary traits, what innovation is missing regarding clarity in definition and process is what projects seem to excel at with some clear and widely consented definition and agreed processes that the innovation area is still searching for. Looking at the similarities, it is seen that today's modern organizations are trying to use both innovation labs, R&D centres as well as the project and program offices to break from the traditional organizational structures. All with the hope to improve coordination questions for a final deliverable that is new, unique and different.

According to the Rothwell innovation generations (1992), it is likely that the first generation of R&D push model is associated with the defence projects, due to the required science push

version of innovation. As the use of project spreads from the military into business, more attention started to be paid to customers under the name of a market pull model. However, the second and third generation innovation models have not affected project management's approaches at large. The fourth-generation model of innovation made a significant development in project management practices. The high levels of cross-functional integration in this model led to the emergence of different models of project organization such as matrix management and the emergence of various leadership requirements for project teams.

More recently, research in this relationship started to attract more attention, by questioning the value and relevance of the traditional project management processes to achieve exploratory missions in organizations (Lenfle, 2014), which offered a starting point for arguing for alternative ways to manage projects that are aimed at innovation. However, the study didn't pinpoint a clear model that can be conceptualized and used by organizations. New research in 2016 done by Mahmoud-Jouini and co-authors (2016), used some elements of design thinking within project context to foster innovation (Mahmoud-Jouini, Midler, & Silberzahn, 2016) yet again while it highlighted the interaction, it didn't offer a specific frame to bridge between the two areas.

Some of the common design thinking tools and the task they achieve (Liedtka, 2014) combined with the use of system dynamics to simplify the complexity from adding the two disciplines together (Jay W. Forrester, 1994), we think could benefit the potential integration between projects and innovation. This would include, use of visualization such as the charts,

graphs, and storytelling, observing and thorough understanding the users, organized collaboration such as brainstorming and mind mapping, creating and agreed assumptions, and finally prototyping by making the ideas more tangible, and piloting through field experimentation with the stakeholders.

At the more practical level, governments, industries, and organizations are always challenged by their leaders, stakeholders, users, and customers to show relevance by adding value with new services, products, and solutions. At the same time, the same stakeholders are very demanding for the agile delivery of these results with high quality. Both are competing, and often contradictory demands that can be very challenging to be met by organizations (Rosenbusch, Brinckmann, Bausch, 2011). Especially since creating new and unique value often requires a different set of skills environment (Reflective, creative process with the need for a reasonable time to experiment) than those required for delivering rapid results (Time intensive and process-driven activity).

2. Organizational Paradox

With this complexity, companies, industries, and governments face two primary spectrums: the quest for delivery or search for creativity as shown in figure 1. They often decide to focus on only one side of the two spectrums, as an example, the delivery of rapid results (products or services) on time and agile fashion while ignoring the continuous need to create new and unique value to their stakeholders, and the other way around would also apply. This situation is often the reason why many firms struggle to sustain its activities for the long—

term. Industries start to struggle and get merged into other advanced sectors. And government falls into an economic downturn (Rodrik, 2016).

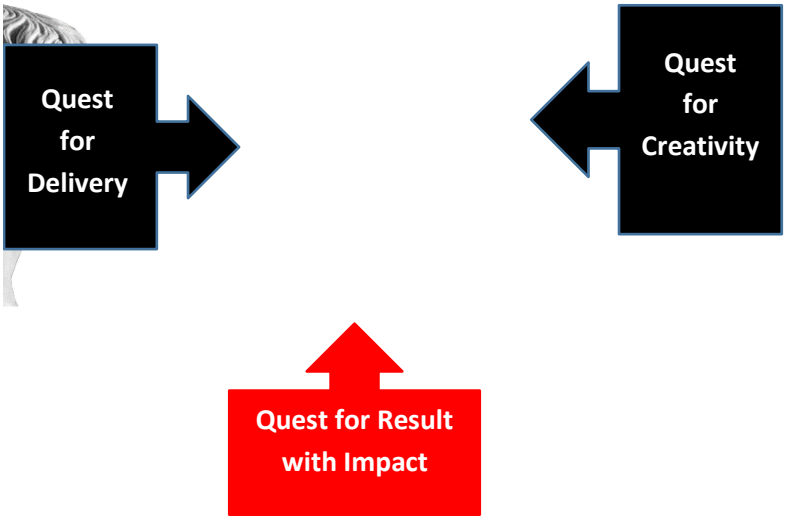

Figure 1. Organizational Paradox

This state of complexity caused by the contradictory nature of the two increasingly stakeholder-demanded areas (Figure 2). One Innovation that is intangible, hidden and dependent on the organizational ability to realize new value through the brainpower and organizational intellectual capital (Edvinsson, L. and Malone, 1997), and another (Project) that is often tangible, scope-defined and can be realized through established processes (PMI, 2004).

The human factor represented in skill requirements, i.e. being creative & reflective, yet agile & discipline, for the two areas (Innovation & Project) that at times contradict each other, yet

are required to interact together. Another point is on how the two areas' process areas and organizational structure, i.e. being open and flat yet scope-defined and structured, could be potentially interlinked inside the same organization with the objective to satisfy the internal and external stakeholders. The theoretical model is therefore aimed to assist organizations, industries, and government in meeting the increasing stakeholder demand for creating new value (Innovation) while delivering results (Projects) that sustainably benefit the economic and social levels (Impact) (see figure 2).

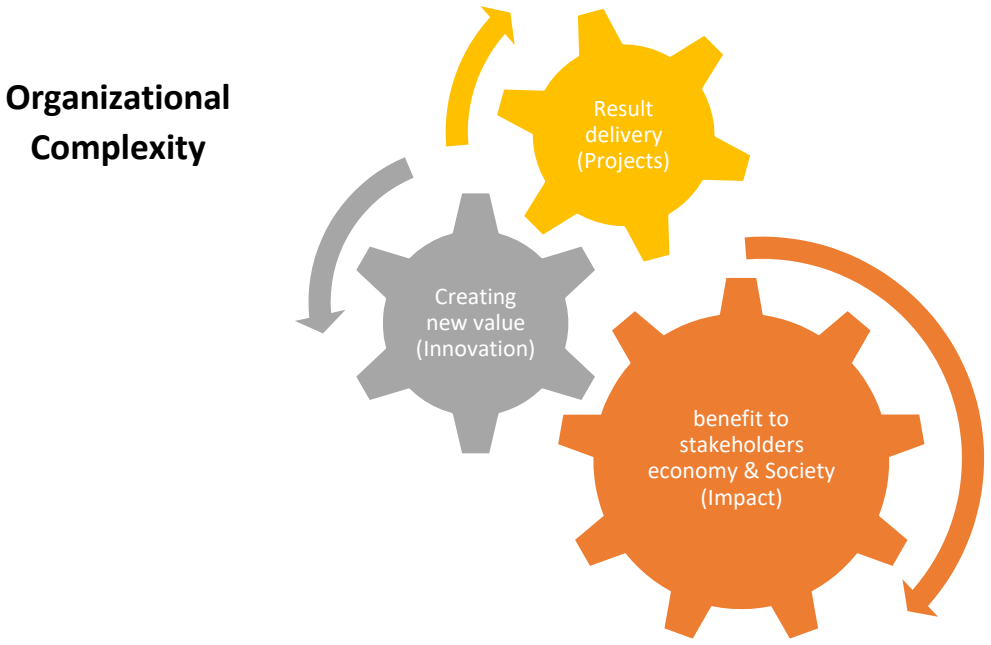

Figure 2. Organizational complexity

3. Conceptual framework

The particular angle of the research is the concept of “Innovation Projects with Impact” (See figure 3). It aims to build on and go beyond the current project management degree-one research categorized by Navarre (1989), as well as advancing from the fifth generation in innovation models described by Rothwell (1991/92/94) by exploring the interrelation of the two areas. This work also benefited from the research that has been done in “business projects,” and “product development projects” (Artto & Wikstrom, 2005), by specifically studying the “innovation project” and their impact on the firm, industry, and country levels.

The proposed conceptual framework is to challenge traditional project management processes and organization by attempting to design-think the innovation and the project phases and activities referred to here as “Pro-Innova" for short. The research argues, validates and proposes this new theoretical model, using some aspects of the system dynamics loops to move away from the waterfall sequential process blocks that could limit our ability to imagine and paint a new framework of project collaboration through the use of process ontology (Chia, 1997; Rescher, 2012). The focus was to analyze the complementary and shared traits found in both areas (Innovation and Project) to address the challenges, limitations, and contradictions as well as the complexity each area has on its own.

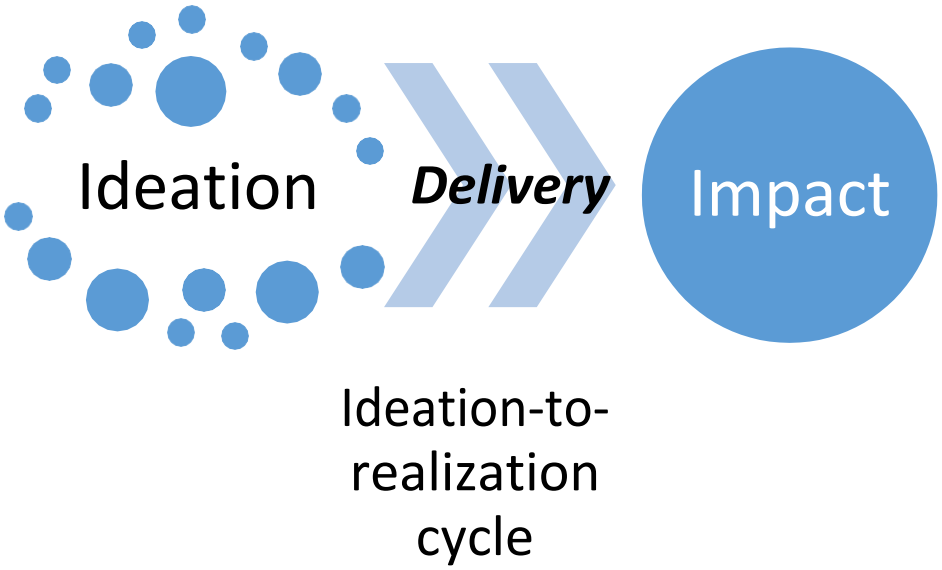

Figure 3. Innovation Projects with Impact

As illustrated in figure 4, the proposed theoretical framework (Pro-Innova) hypothesizes that projects that are aimed for innovation need to be conceptualized and managed differently from traditional projects. The ultimate objective here is to try improving the innovation realization as well as increase projects' rate of delivery success. The integration between both areas is therefore needed in the context of modern management.

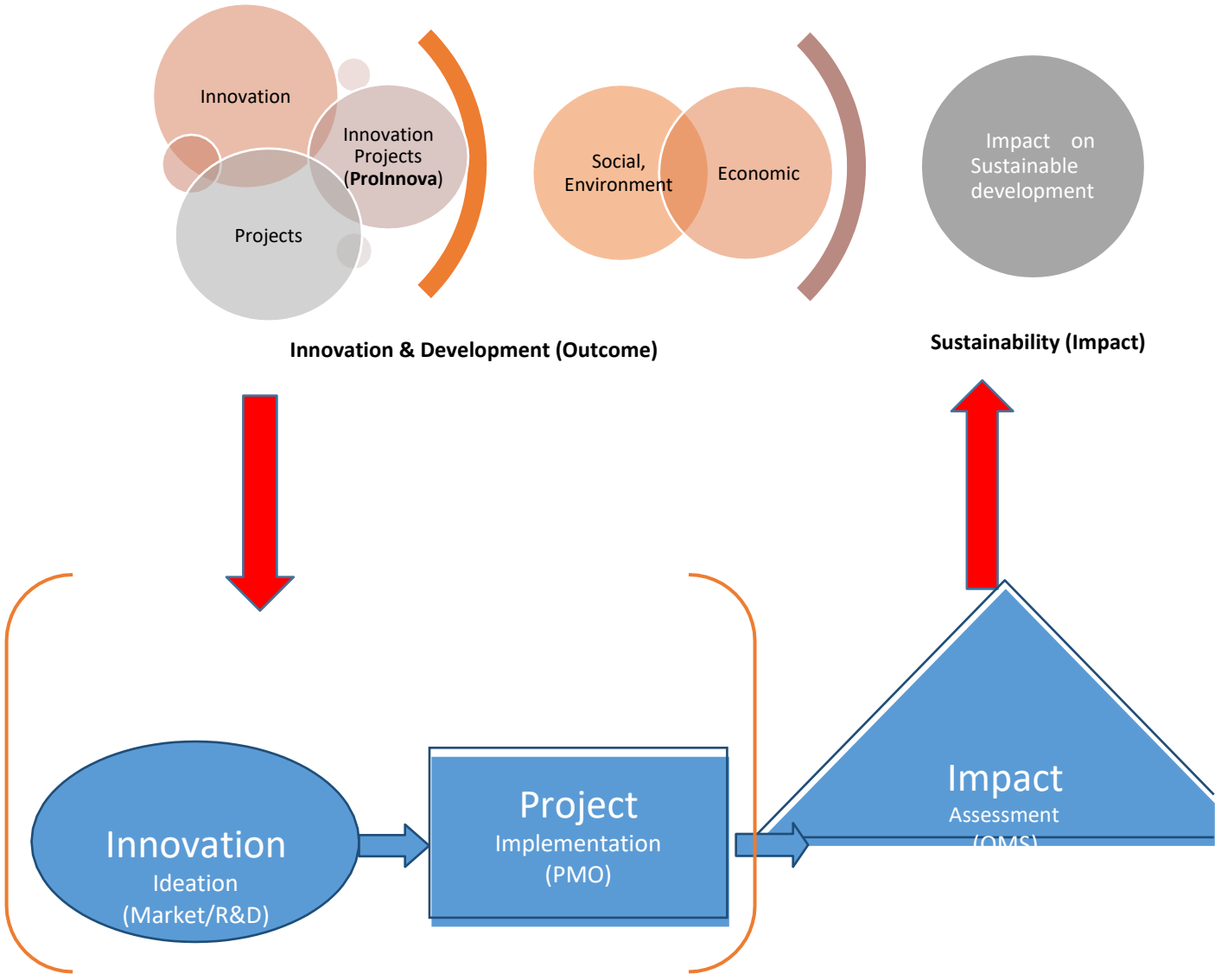

Figure 4. Pro-Innova framework

Initially, the Pro-Innova framework proposes to start including the **innovation's ideation phase**, borrowed from the innovation processes (Desouza, Dombrowski, Awazu, Baloh, Papagari, Jha, & Kim, 2009) as the independent variable of the Pro-Innova framework. This

phase becomes the new starting point for any project that intends for significant innovation, instead of starting the project with the traditional planning, scheduling, and controlling sequential activities (Lewis, 2001; Söderlund, 2002), which historically came after the ideation and market study/business case phases had been already finalized. Traditionally, projects start after the market research and ideation activities, causing a major disconnect between what was intended and what is finally delivered hence impacting new ideas to become a reality as well as project's success in the more general term (Heising, 2012).

The other new addition in this model is to add the **project's implementation phase** (*dependent variable of the Pro-Innova framework*) to be linked to the starting innovation's ideation phase, which traditionally lacked this integration and often stopped at the R&D and market intelligence and scanning stages. This addition allows the ideation and implementation to work together from the start to the end of the cycle, hence motivate the project to achieve the intended goals. Since it is now starting to be involved from the ideation phase, hence better understand the rationale and intention for the project. It also allows the innovation (R&D) to act as an internal sponsor for the project implementation since it is now a connected phase within the innovation grand and extended cycle.

Lastly, the Pro-Innova model extends beyond frameworks like design thinking to suggest the closure of the project is at the **impact assessment** of the final deliverable, and not the traditional project closure phase. This way the innovation project work is assessed based on the impact of the idea and not just the project short-term outputs (Matta, Ashkenas, 2003) as in the time and cost performance indicators at the traditional project deployment stages.

It's inappropriate to underestimate the theoretical and practical difficulty in integrating these two complex areas "Innovation & Projects" (If we are also to exclude the third area "Impact"). Projects are cooperation structure, in achieving some common operation through the association of some actors for a common goal. The problem of coordination attracts attention to different kinds of challenges, which are dealt with by the use of classic coordination mechanisms (Van de Ven, Delbecq, & Koenig, 1976).

Although projects are in some work conceptualized as knowledge collectivities (Lindkvist, 2005; Ahern et al., 2014); this does not mean that all projects are seen as being similar. It, therefore, requires implementing a version of contingency model into it. Shenhar and Dvir (2007) argued that to study different types of projects and various solutions to the coordination problem, the key fact is "Contingency Factors," such as uncertainty (driven by the market and technological changes), Complexity, and Pace.

The Pro-Innova framework also addresses this complexity by considering "Designed Thinking" approach. Designers have traditionally focused on creating or enhancing the integration between idea and implementation. Recently, they have begun using design techniques to deal with more complex problems. As an approach, the design thinking analyzes capacities we all have, but that is overlooked by more conventional problem-solving practices. Not only does it focus on creating products and services that are human-focused, but the process itself is also human-oriented. This approach relies on our ability to be intuitive, to recognize patterns, to create ideas that have emotional meaning as well as being functional, and to express ourselves in media other than words or symbols (Brown & Katz,

2009). It is clear that nobody wants to base an organization on feeling, intuition, and inspiration, but an over-reliance on the rational and the analytical can be just as risky. The integrated approach at the core of the design thinking process could provide a third way. Pro-Innova adds to design thinking the impact assessment aspect; it also looks for all opportunities and not just problem-solving.

In the Pro-Innova framework, design thinking can be assembled by using some of the nine project perspectives (Contingency, optimization, modelling, success, governance, marketing, behaviour, process & decision). More specific to this research question, the ones we have described at the project conceptual & theoretical definition section: Human behaviour, success in business and contingency factors (Turner et al., 2010).

This conceptual framework (Pro-Innova) analyzes and considers the role of the complexity in the integrated system. Addressing the question of how a single project could incorporate several project perspectives all at the same time, to take an idea into action alongside managing the very often unpredictable human factor within the project and with outside stakeholders. Defining and realizing the meaning of the project success with all the different conflicting interest from the various stakeholders. All while looking at the project within the business context and understand the relationship between its outcome (the new product development) in the innovation cycles. And finally, making sure that it is adaptive to the different context and changing environment, at the same time, still being able to stick to the project baseline.

The Pro-Innova theoretical framework explores the engineering concept of system dynamics (Jay W. Forrester, 1994) to help understand those different interactions and dynamics between the various design-thinking assembled perspectives to create an end-to-end cycle with linked loops starting from ideation to the final impact, passing through the implementation factory.

Table 1. Pro-Innova 4-perspective system dynamics matrix

Human	Success	Business	Contingency
Examples: Sponsor (High interest — High Influence)	Outcome: financial value of the new product	New Product development	Customer feedback
Government (High influence— Medium interest)	Impact: Socio-Economic value	Sustained Development	Regulatory requirements

The below visualization of the proposed theoretical and conceptual Pro-Innova framework attempts to illustrate the adaptability and system dynamic interaction between the research model (Interaction between innovation cycle and project phases) and the four perspectives

to have the general idea of the overall scope of the Pro-Innova framework (see table 1 and figure 5).

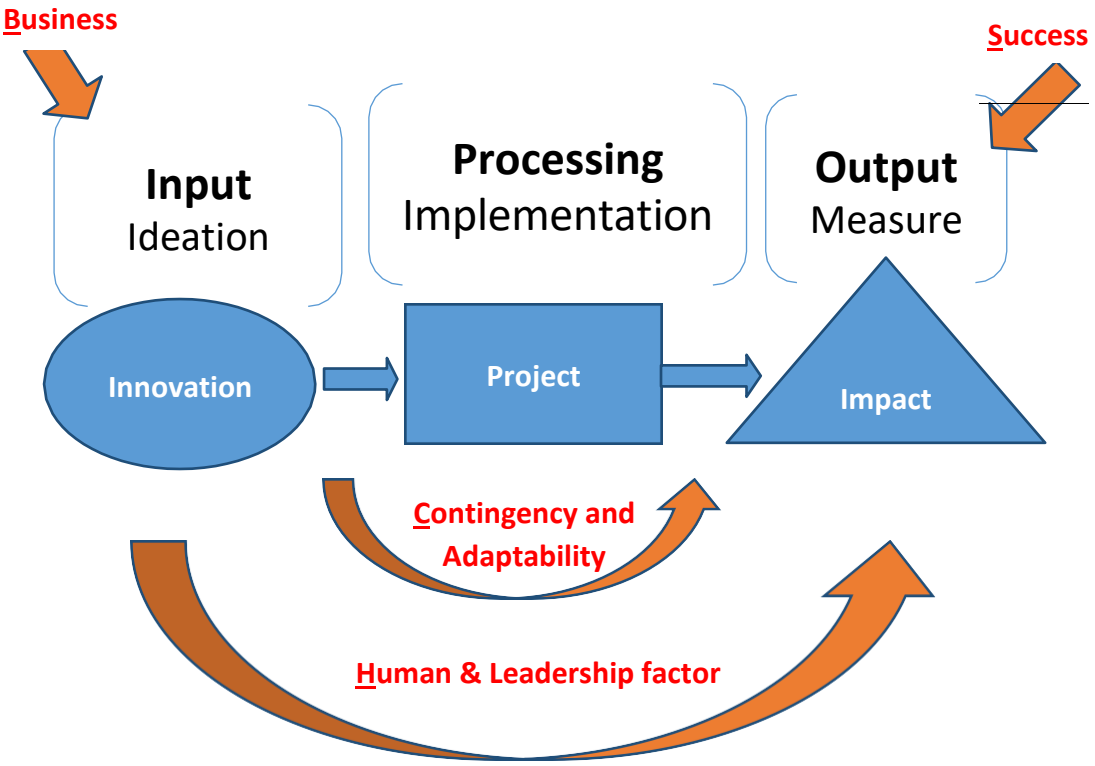

Figure 5—Pro-Innova Adaptive System & 4-Perspectives

4. Conclusions

Our research identifies a unique area within projects that were rarely discussed in research that is when organizations are managing vague, ambitious, and outside the box exploration missions with little clarity on the scope, timeline, and resources. As shown in Figure 6, our proposed Pro-Innova framework is best at use when the degree of originality in the innovation ideation is very high, while the discipline and agility for project implementation are also high.

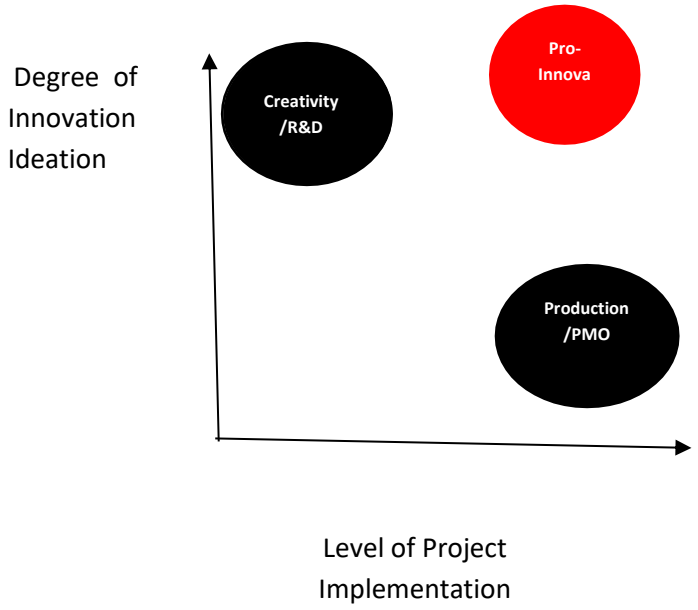

Figure 6— Pro-Innova Unique Position

The proposed theoretical model (Pro-Innova) to help analyze the interrelation between innovations and projects shows that Pro-Innova is a framework that could potentially aid innovators in their struggle to materialize their ideation cycle while assist project leaders to make sense of their delivery work. The model attempts to assist at the macro level to balance the forces from the two polar disciplines within the organization, industry, and country. The Pro-Innova tries to break down the complexity by bringing the two areas of idea creation and project implementation with a particular look at 3Cs:

1. Creation of new concepts and ideas
2. Coordination within the organization to deliver effectively and efficiently &
3. Communication and engage with all the internal and external industry or global stakeholders for a higher impact with success.

However, it is worth noting that major work is still required to zoom down from the theoretical framework into a new and more practical management system that details how Pro-Inova could be operated with detailed processes, systems, roles and organizational design. This should include a comprehensive resource & competency study to avoid straining existing resources by doing more than one task they used to perform, e.g., project managers becoming Pro-Innova leaders with innovation responsibilities they didn't know o have before and vise versa.

In this light, we are currently collecting empirical evidence through case studies and survey to further detail the Pro-Innova model and its variables (Idea creation & Project delivery impact), and assess its viability at the organizational level.

CHAPTER 4

PRODJECTING THE FUTURE: NEW PRODUCT-PROJECT DEVELOPMENT - THE PROD-JECT MANAGEMENT SYSTEM - SECOND ARTICLE

Published in the September-December 2018 edition of the Journal of Modern Project Management, the article "ProdJecting the Future: New Product-Project Development — The Prod-Ject Management System" (Albaidhani, Meddeb & Romero, 2018) was written as a build-up from the first conceptual article to present the empirical results of this research, and reveal some of its key findings including the description of the new project-product management system with its practical processes, systems and organizational structure.

Abstract

Several new theoretical models suggest integration between the creativity and implementation activities for a comprehensive innovation cycle and complete project phases. However, organizations need more guidance to improve the project/product success rate. Therefore, the empirical research discussed in this paper revealed that the two variables (idea creation & Project delivery) are actually linked and could be considered for possible integration. A new and more practical management system ProdJect was also unleashed that detailed how the two variables could be operated with detailed processes, systems, roles and organizational design. The ProdJect management system offers a detailed

and comprehensive purpose-to-impact cycle, giving a new and unique evaluation model for the project and product development type that looks at effectiveness, relevance, and overall sustainability instead of focusing on limited aspects of work such as time, cost and scope.

1. Introduction

Several new theoretical models suggest integration between the creativity and implementation activities for a comprehensive innovation cycle and complete project phases. They serve as good conceptual models (Hobbs, Aubry, & Thuillier, 2008; Martinsuo, Hensman, Arto, & Kujalo, 2006; Thomas, Williams, Cicmil, & Mullaly; 2010), yet, still require to be further detailed into a more practical management system for companies, industries, and even for countries to be able to use effectively.

On the one hand, project fail rate could be largely attributed to the state of mind of many organizations that approach new projects trying to predict all its details (scope, time, cost and stakeholders) from the conception stage, not sighting several unknown variables in an increased organizational complexity (Matta & Ashkenas, 2003). And on the other hand, innovation failure could be reasoned to organizations vague approach that tend to focus only on the creative part with neglecting taking it to the realization stage.

Organizations are seeking new frames that provide flexibility and structure to navigation fluidly through complexity. Especially in exploratory innovative journeys when little information is known about the project. Therefore, this paper enquires to address some of

today's modern organization challenges in creating new value while delivering the result. The goal is to analyze the complementary and shared traits found in both areas (Innovation and Project) to address the challenges, limitations, contradictions as well as the complexity each area has on its own. Identifying a unique area within projects that were rarely discussed in research when organizations are managing vague, ambitious, and outside the box exploration missions with little clarity on the scope, timeline, and resources. Our focus is where the degree of originality in the innovation ideation is very high, while the discipline and agility for project implementation are also high. This paper is structured as follows: next section presents the theoretical background and the Prod-Ject model. The third and fourth section details respectively the research methodology and the results. And finally, discussions for applications and modifications are presented in the last section.

1. Theory background

2.1. Literature review

New theories are emerging to challenge traditional project processes and organization as well as the definition of innovation management system by attempting to design-think the innovation and the project systems, phases and activities (Albaidhani and Romero-Torres, 2018). These new research argued and proposed new theoretical models, using some aspects of the system dynamics loops to move away from the waterfall sequential process blocks that could limit our ability to imagine and paint a new framework of project collaboration through the use of the process ontology (Chia, 1997; Rescher, 2012). The focus

of these new theories was to analyze the complementary and shared traits found in both areas (Innovation and Project) to address the challenges, limitations, contradictions as well as the complexity each area has on its own, as shown in Figure 1.

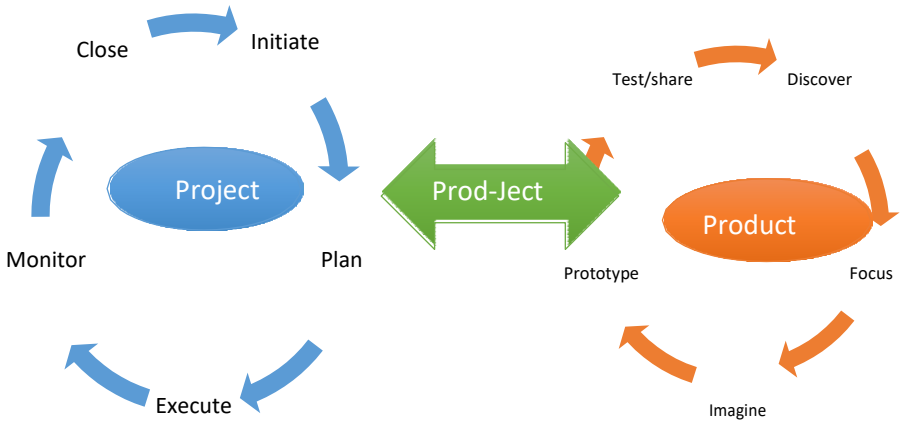

Figure 1: The interaction between Project and Product development (Project-Innovation)

This new research identifies a unique area within projects that were rarely discussed in research that is when organizations are managing vague, ambitious, and outside the box exploration missions with little clarity on the scope, timeline, and resources. As a framework that is best used when the degree of originality in the innovation ideation is very high, while the discipline and agility for project implementation are also high (see figure 2).

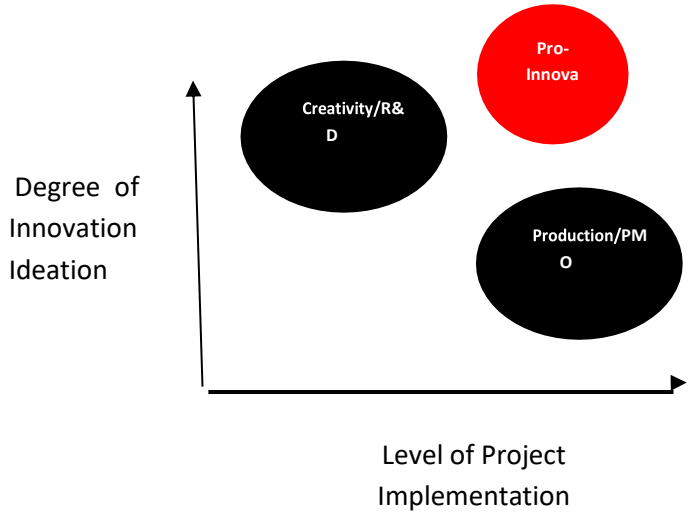

Figure 2—Project Innovation (Pro-Innova) Unique Position

The project innovation new theoretical models help analyze the interrelation between the two areas to potentially aid innovators in their struggle to materialize their ideation cycle while assist project leaders to make sense of their delivery work (Creating a purpose-to-impact full cycle). At the macro level, they help balance the forces from the two polar disciplines within the organization, industry, and country.

However, it is worth noting that major work is still required to zoom down from the theoretical framework into a more practical management system that details how Project Innovation could be operated with their detailed processes, system, roles and organizational design. This would include a comprehensive resource competency study to avoid straining existing resources by doing more than one task they used to perform, e.g., project managers becoming innovation leaders with responsibilities they didn't know or had before and vice versa.

In this light, we collected empirical evidence to detail the project and innovation cycle, and assess its viability at the organizational level. This research and the proposed management system were mostly driven by the notion that it should ultimately create relevance to the field of practice (Blomquist et al., 2010). Hence the survey came to test the viability and practicality of some of the proposed project innovation conceptual models in an attempt to bridge the current gap being observed between management theories and the field management practice (Mintzberg, 2003). This gap is even more apparent in the field of

project research with the ongoing tension between the practitioners' point of view on what a best practice is and consequently the creation of the body of knowledge for project management versus the project research and theories (Cicmil & Hodgson 2006).

The research took a brief view on top-down traditional system on how rational structures in projects and innovations and how best they could be managed (Andersen, 2006); (Dvir and Lechle, 2004); (Pinto and Slevin, 1989), nonetheless the main focus of the research was on the process by studying the past, present and future of how the projects and innovation processes relate to the entire organizational structure (Legris and Collerette, 2006); (Lindkvist et al., 1998); (Lundin and Söderholm, 1995); (Sutterfield et al., 2006) with a special attention to the practice by relating the process through the bottom-up identification of a local situated actions (Hällgren and Wilson, 2007); (Hodgson, 2004); (Simon, 2006).

Overall, paradigm belief theory (Guba & Lincoln, 1994) and constructivism discipline were guiding this research work, assuming that there isn't just one-way of the truth as it is relative and highly dependent to its context, opening the concept for interpretations. This belief allowed for us to freely study the nature of the relationship between two traditionally different areas of research (Project & Innovation). It also allowed for the proposed concepts and models to be open, adaptive and contextual to the type of work and industry the reader may belong to.

1.2. The Prod-Ject management system

The project management perspectives covered the school of thoughts within each standpoint. They represent some common traits, styles, methods, and ideas (Turner et al., 2010). The nine perspectives grouped into four main project-focused categories: project performance, project business, project people, project solution, contingency, success, behavior, process, optimization, governance, decision, modelling, and marketing. Perspectives that are the closest to the project and product development research are those linked to the use of contingencies, success, governance, marketing, behavior, and process within project development.

The simple concept of innovating something new is somehow linked to what projects are intended for (i.e. creating something unique). Both are linked to the basic idea of development (Tim Brady & Mike Hobday, 2012). Innovation and change in organizations are often dependent on projects, one-time initiatives to lunch new products, and new processes. The project is usually the means by which innovation takes place. Therefore, projects are a key way of organizing innovation and the innovation is a major output of certain kinds of projects.

According to the aforesaid defined innovation generations, it is likely that the first generation of R&D push model is associated with the defence projects, due to the required science push

version of innovation. As the use of project spreads from the military into business, more attention started to be paid to customers under the name of a market pull model. However, the second and third generation innovation models have not affected project management's approaches largely (Rothwell, 1992).

The PROD-JECT Management System (Prod-Ject MS) referring to the combination of the Product and Project management for organizations to be more effective in predicting and projecting their future using some defined steps and processes to create and realize new concepts and solutions.

The new management system combines phases from the R&D and new product development cycles (e.g. Idea creation and screening, business and market analysis, testing and others) with some of project management phases (e.g. planning, execution, monitoring and closing), while coming back at the end of the Prod-Ject cycle in a system approach to integrate the impact and success factors (see figure 3).

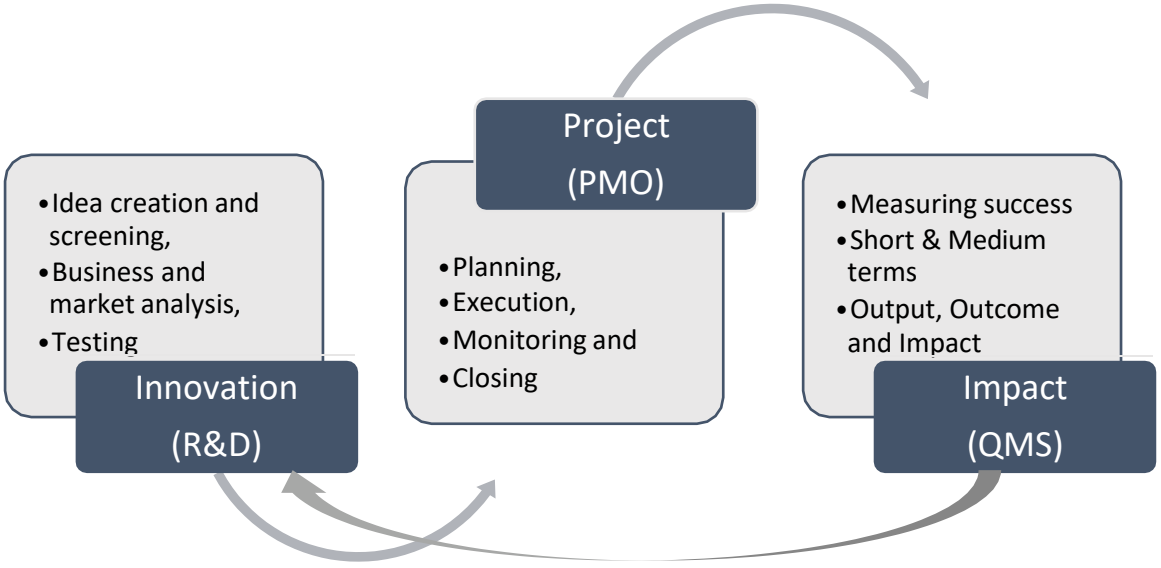

Figure 3. The Prod-Ject Management System

3. Research methodology

A mix research method approach was deployed including semi-structured interviews, and ethnographically observed case studies from the aviation industry and trade development sector, which are ranked low in innovation projects i.e. investment in research and development and overall economic performance (McKinsey & Company, 2013). A survey was also conducted to further validate the interview and case study observations. Consequently, we could potentially validate and help further define the detailed structure, processes, roles,

and systems forming a more practical working model, which expands from the theoretical frameworks into a new management system.

The research methods were mostly driven by the notion that it should ultimately create relevance to the field of practice (Blomquist et al., 2010) hence, the practical management system came to test the viability and practicality of the proposed theory in an attempt to bridge between the current gap being observed between management theories and the field management practice (Mintzberg, 2003). This gap is even more apparent in the field of project research with the ongoing tension between the practitioner's point of view on what is a best practice and consequently the creation of a body of knowledge for project management versus the project research and theories (Cicmil & Hodgson 2006).

The use of a blend of qualitative and quantitative research approaches in this research was designed to increase the rigour of its findings; each methodology used works to complement and not compete with the other methods, in a way that it should help address some of the gaps and weaknesses that can be found in each method independently.

Overall, paradigm belief theory (Guba & Lincoln, 1994) and constructivism discipline are guiding this research work, assuming that there isn't just one-way of the truth as it is relative and highly dependent to its context, opening the concept for interpretations. This belief allowed for us to freely study the nature of the relationship between two traditionally different areas of research (Project & Innovation). It also permitted for the proposed concepts and

models to be open, adaptive and contextual to the type of work and industry the reader may belong to (see figure 4).

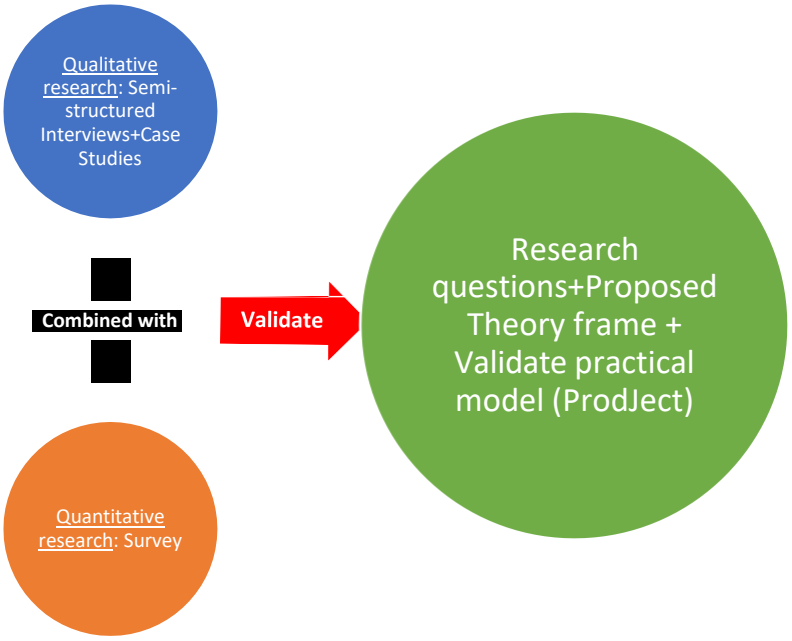

Figure 4. Research Method

The semi-structured interview method was used to confirm or not the researcher ethnographic field observation for the proposed theoretical model and to assess the applicability of the proposed theoretical model. The questions were mostly open needed to allow the interviewees to provide comprehensive and specific perspective. The people interviewed were experienced leaders in projects management and worked in industries closed to the two observed case studies, i.e., aviation and standard development. This method allowed for a direct interaction between the researcher and the research object variables (Aubry & Hobbs, 2011).

The interview questions were therefore primarily centred on the application and less on the exploratory part that was used in field case study observation. Five groups of questions (Each with sub-questions) to unleash and validate all aspects of the ProdJect Management System:

1. Questions about the interviewee perception of the industry and organization key challenges. Example: from your work experience in the industry, what are some of the key challenges it currently faces? Same question about their company challenges (This generic question is to confirm [or not] the innovation challenge that was observed).

2. Questions about the current processes and activities with relation to innovation. e.g., what their organization does to create new value (products & services) for its members in the industry? Further follow-up questions will be asked to detail their processes, roles, systems, and structure. These sets of questions are to assess the interrelation between the independent variable “Innovation ideation” processes and spot any linkages it currently has with the dependent variable “project implementation.” This question also assessed the viability of a management system through questioning the phases, roles, structure, and systems.

3. Questions about the current processes and activities with relation to project e.g. what does the organization do to deliver value (projects & programs) for its members in

the industry? Further follow-up questions asked to detail their processes, roles, systems, and structure

4. Questions about the interviewee's view on how best to address and improve the issue of creating value and delivering it to their industry members and stakeholders, e.g. what in your view would be the best working model to improve the innovation and project delivery in the organization for its industry stakeholders and members?

5. Final questions asked about the impact assessment e.g. and so in your organizational case, how would you define if the innovation is successful? And similarly what makes a project successful or not in your view?

The use of an international multi-sector/country survey using an online questionnaire came to validate the observation made from the interviews and field studied cases and to try to understand the processes, roles, and organizations around the innovation project area. The questionnaire was targeted to leaders and professionals who led and participated in projects and innovation from a broad range of industries, and from several countries around the world.

The questions have been tested and standardized to tackle issues related to the research hypothesis:

- Understand key modern organizational management challenges

- Assess the relationship between innovation and projects and the variables (Ideation & implementation)
- Evaluate the proposed ProdJect model in more practical details from processes, organization, roles, and responsibilities
- Understand and define success in innovation projects

The questionnaire was designed in three main sections; the first part is related to explaining the research aims and objectives, assuring confidentiality and requesting consent. The second part is related to demographics to identify the respondents' experience, industry, country and others to allow for the variation analysis to be conducted based on sectorial or regional affiliations. The third and main section is related to assessing the proposed model variables with questions that scale from 1 (Strongly Disagree) to 5 (Strongly agree). Survey Participants were selected based on the following criteria to add value to the research questions to validate findings from interview and field case studies:

- Scholar, professional or management role in either small, medium or large sized organization to be able to reflect the reality of modern organizations.
- Sufficient knowledge and exposure to the area of project management and innovation in order to be able to understand and contribute to the different model variables
- Diversity in the participants from the public, private and social sectors and various industries to capture the similarity and differences across the various industries & sectors
- Diversity in the participant's gender, country & region of the world to address the point of gender, cultural and regional variation

The questionnaire was shared with about 500 scholars & professionals with varying project or innovation management background from +60 countries in about 20 industry sectors (Figures 5–10).

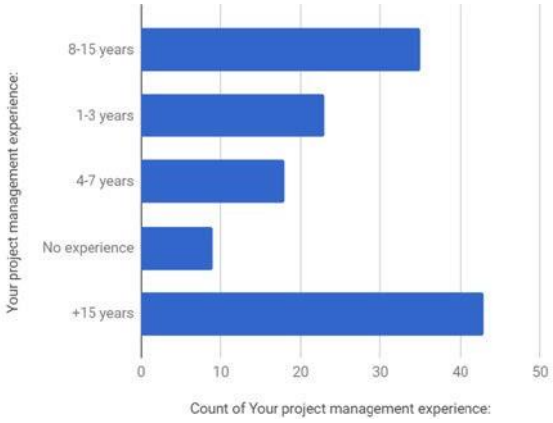

Figure 5. Survey participants' experience

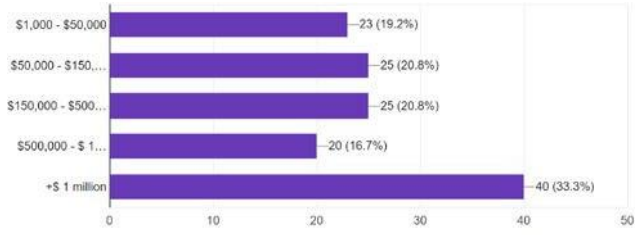

Figure 6. Survey participants' size of projects

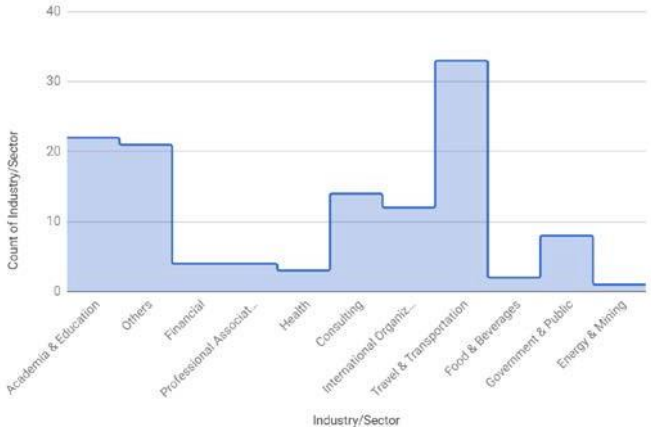

Figure 7. Survey participants' Industry

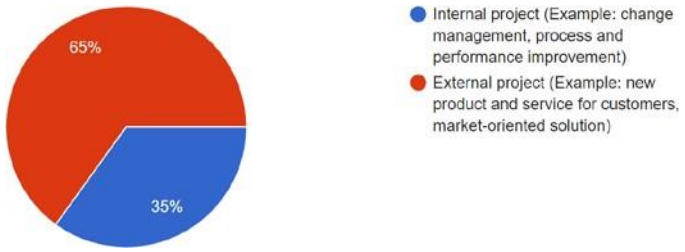

Figure 8. Survey participants' Type of Project

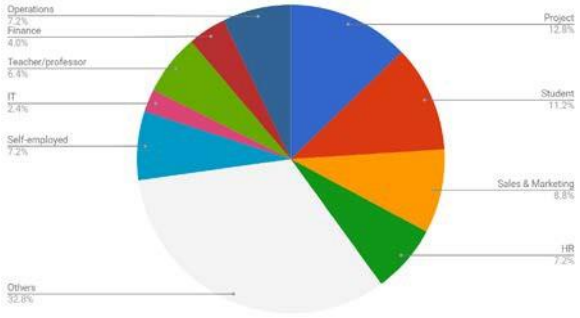

Figure 9. Survey participants' Role

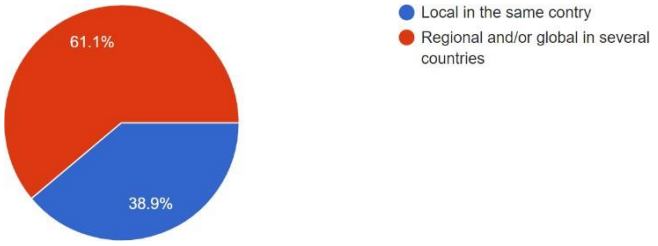

Figure 10. Survey participants' Scope of project work

The participants were from industries such as aviation, IT, consulting, education, food & beverages that are based in countries like Switzerland, Canada, the US, Dubai, Singapore, and others (see figure 11). An advertisement at university conferences and on targeted social media was used to reach out to relevant contacts for the online survey, using a web questionnaire tool.

Respondents were encouraged to be spontaneous, reflect their realities (No right or wrong answers) and be as decisive as possible. They were also given open-ended commentary areas for a more qualitative explanation to their quantitative rating. The questionnaire remained open for about six months to allow for all the different segments to feed in their viewpoints.

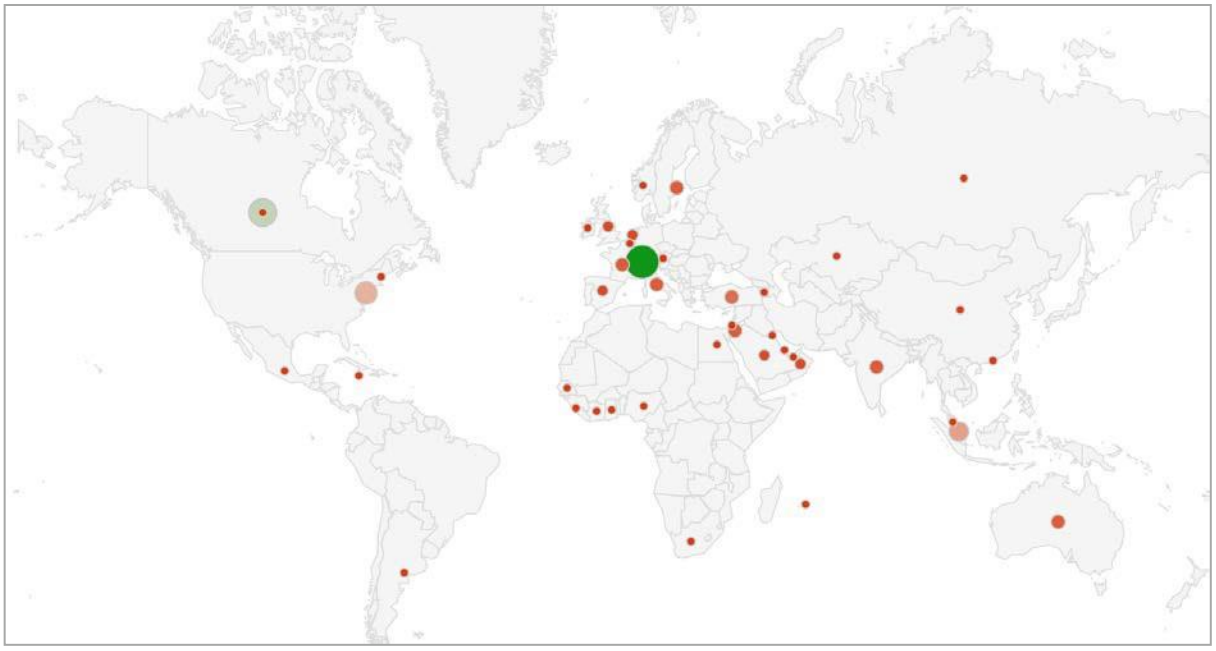

Figure 11. Survey participants country (The bigger the circle the more participants from the country).

4. Findings

4.1. Aviation industry

The semi-structured interviews and ethnographic observation summarized in the two case studies revealed some interesting findings in the aviation case.

The organization seemed to be delivery-driven with many projects and programs that are being deployed for the various aviation value chain stakeholders around the world. This

could be partly attributed to the nature of the industry that is fast-changing and margin-thin when it comes to profitability. Therefore, innovation and creativity placed in a secondary raw compared to project delivery unless innovation is driven by forced external industry change.

It was very seldom to observe the organizations linking innovation represented by creating new solutions to the discipline of project implementation and delivery. Few small departments that are succeeding in the development of new and relevant industry solutions are linking the development to the delivery without even noticing, i.e. creating any formal processes to increase and accelerate the best practice.

The interviews confirmed that many of the great ideas lose its way due to the lack of the experimenting and implementation discipline. There is currently a vivid lack of creative ideas, i.e. leading to new and relevant industry products, services or solutions, either due to the lack of active engagement with their users or for the fact even good ideas don't get to be implemented. Therefore, many of the ideas create today are self-generated and often face massive resistance within the industry value chain.

The project implementation success rate has dropped (Industry Priority Scorecard) mainly due to lack of engagement of the program teams of the value and impact of the solutions they are deploying for the industry stakeholders. Externally, members and industry stakeholders are showing a great sign of dissatisfaction with the organization work, and relevance to their work (Members engagement & customer satisfaction surveys). There were

few examples highlighted in the interviews of successful industry-wide innovative solutions when the owner decided to work on the idea creation with the users and implemented the solution in a pilot approach.

One region appreciated the concept of linking the idea creation to project implementation to the extent that they assigned the idea generator to lead the project as sponsors to ensure its success for the industry. Nonetheless, this is causing a significant constraint on resources, in particular on the idea generator, causing a demotivation factor to create further new concepts.

Interviews from the industry saw a need to bring the idea generation, especially with users, to become an integral part of the solution delivery in order to overcome some of the issues facing the organization to be positioned as innovative by creating more and relevant value to its global stakeholders.

4.2. Trade and standard development

In the case of the trade and standard development case, the semi-structured interviews and ethnographic observation revealed some other interesting findings.

Many experts and technical committees are forming to create new concepts for national, regional or international standards, therefore, the organization and sector are innovation driven by many ideas and concepts that are floating from experts in several industries and

sectors in the quest to come up with a standard way of working and doing things. This sector is mostly voluntary, and experts are often self-funded from their employers, industries, or countries hence have no major pressure when it comes to financial or time management.

The observation is that the organization and sector always placed the creative part, i.e. creating new standards away and separate from the project delivery, i.e. publishing and materialization of the standard. The organization works with hundreds of new concepts for potential standardization. However, many are lacking more than three years of discussion within the technical committee members (Standard development stage dashboard).

The technical committee has a chair who is often a leading expert in the subject matter and a secretary that assists in the compilation of the feedback. It clearly lacks any principle of project time and scope planning as it's often left to the discretion and good judgment of the technical committee members. This results in problems at the industry and country levels due to the lack of standardization, which in turn influences the creation of substitute standards that are of less quality and consensus. Even when the standard is delivered after three or four years, it sometimes loses its relevance due to the fast-changing technical aspects, or to enter in a none-ending scope expansion of the standard resulting in further delays and creeps.

There are few successful agile technical committees who delivered on new standards on time with high quality and consensus from their respective value chain stakeholders. The chairs and secretary of those technical committees were often very charismatic, align and had a

very good sense of planning without necessarily linking what they naturally did to the project management principles.

The creation of new international standards related to project management, e.g. PMI PMBoK, ISO and others, which were formed by technical experts who also possess good project management expertise, have helped raise the awareness of the possibility to link the two areas i.e. creation with the delivery. Interviewees from the sector are seeing the need to be developed and trained in general management areas aside from their established technical expertise to assist them in better planning and delivering their ideas to their industry stakeholders.

4.3. Practical aspects of the ProdJect Management System

The survey result came to shed more light on the practical aspects of the ProdJect Management System. As shown in the figure 12, it seemed that the highest rate of respondents (about 68 of the 110 responded to this question) either “agreed or strongly agreed” with the third option that both creating new value while delivering results at the same time is the biggest challenge they are faced with their stakeholders in the various, sectors and regions. This was closely followed by another group (62) who saw that creating a new value of relevant products and solutions is what concerned them the most with their stakeholders.

Figure 12. Main Organizational Challenge

The majority of respondents (89 of the 128 disagreed or strongly disagreed that there was not a link between the two) saw a link between the two variables of idea creation and project delivery. Secondly, the major agreement (90 of the 128 agreed or strongly agreed) that both variables are linked in the feature that project and innovation produce a unique and new outcome. This group was closely followed by a second one that identified another feature that links the project and innovation as they are progressive in steps and deliverable. Those who saw the link between the two variables in the unique outcome feature had a more exposure to projects that are of a multi-country nature, with external client and market development focus. They also saw that the main enabler for new ideas to become a tangible reality was in the ability to implement them more than its degree of originality and uniqueness.

. The main connecting feature that links project to innovation is that..

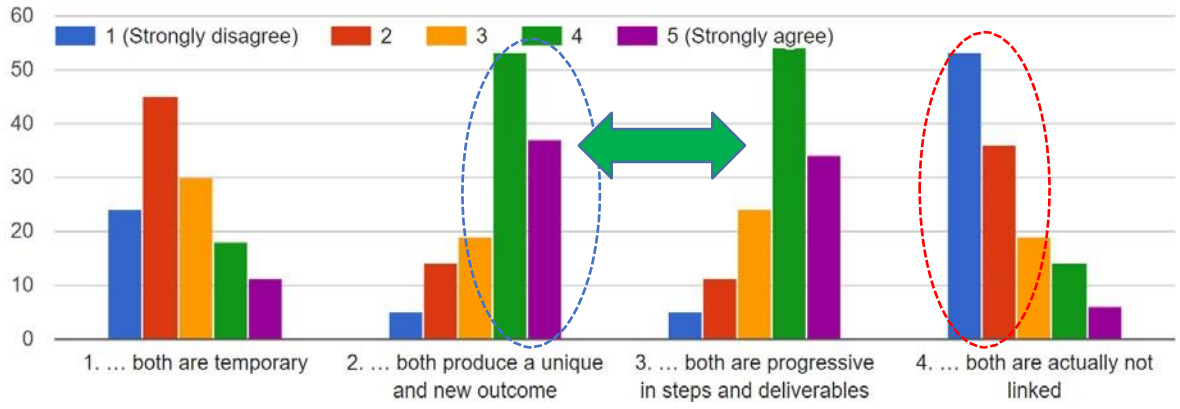

Figure 13. Links between Project and Innovation

As shown in figure 14, 115 of the 128 respondents confirmed by agreeing or strongly agreeing that it is the ability to execute and implement which enables ideas to become a tangible reality. The degree of originality in the proposed idea was seen as less relevant to the realization process in innovation management.

D. The main enabler in making new ideas become tangible reality is ....

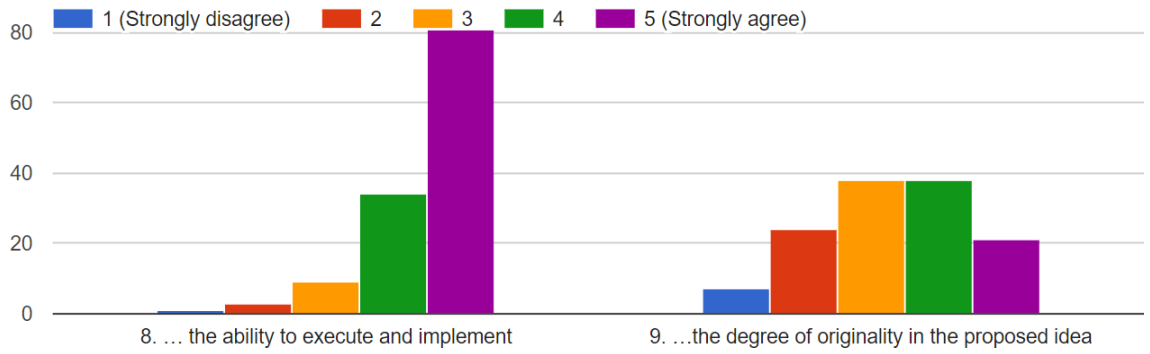

Figure 14. Enablers of Innovation

When it came to assessing the success of both variables, "the impact of the final outcome in the form of the effect of the final product or service on the business or society by meeting its original business plan objectives" came as the highest agreed to option with 111 agreement from the 128 who answered this question (as shown in figure 15). This was followed very closely by the satisfaction of the customer externally or the sponsor internally, with some more strongly agreeing views toward this option. The lowest agreement came for the option that suggested project success is dependent on meeting the time & financial objectives which is ironic how the majority of organizations (including PMI) measure and define the success of all project types.

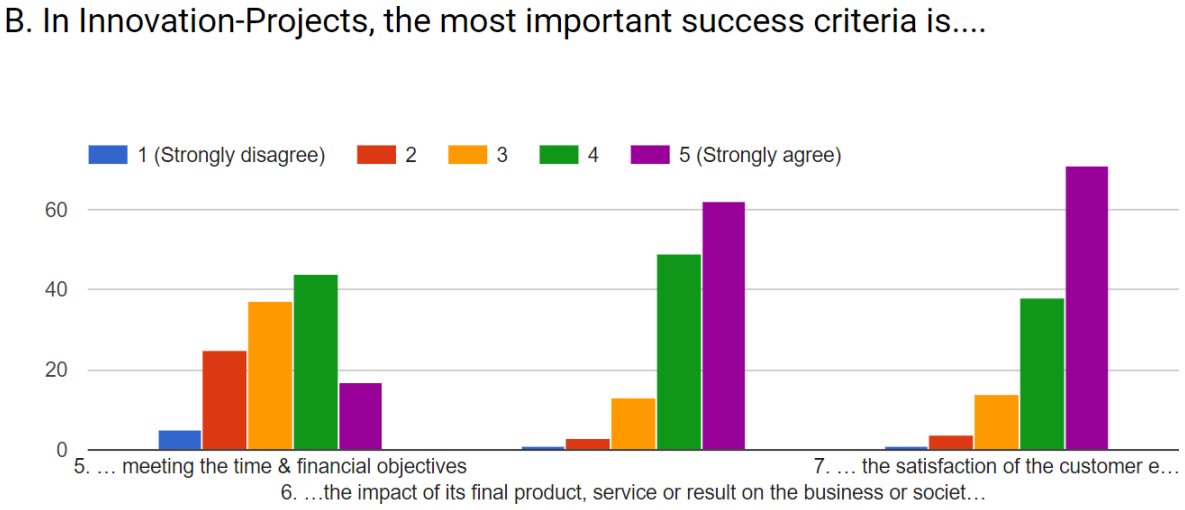

Figure 15. Project Innovation Criteria

Moving from the relationship and output part of the model variable into more input related questions that were asked to underpin a practical model of how one could potentially combine between the two areas and variables. When assessing the factors to ensure the effectiveness of the model variables, 91 from the 128 respondents agreed or strongly agreed with the third option that suggests collecting and measuring the success criteria set by its stakeholders are the most crucial step to ensure the model effectiveness (as shown in figure 16). This was followed by 77 respondents that indicated the integration of the project in the original idea creation or business planning phase is what matter the most. While option one to consider planning as the most crucial factor for effectiveness came last, which yet again challenges existing assumptions that planning should be considered as the most crucial in all project types.

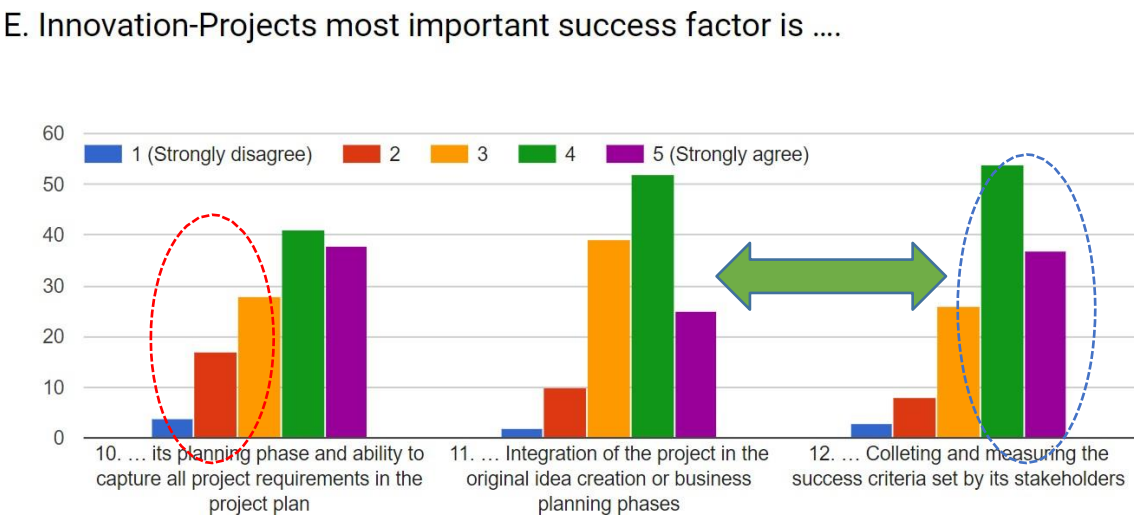

Figure 16. Project Innovation Success Factors

A second question was asked related to the input part of the model with a special focus on the processes and phases breakdown. As shown in the figure 17, the majority of the respondents (106 from 128) agreed or strongly agreed that the best breakdown of phases in the innovation projects is the third proposed option that starts with Idea Creation and Feasibility, Project Planning, Project Execution, Project Monitor, and Project Close, and concludes with Idea Impact Assessment. Whilst the majority disagreed with the traditional view and breakdown of projects that begin with Project Planning, Project Execution, Project Monitoring, and ends with Project Close.

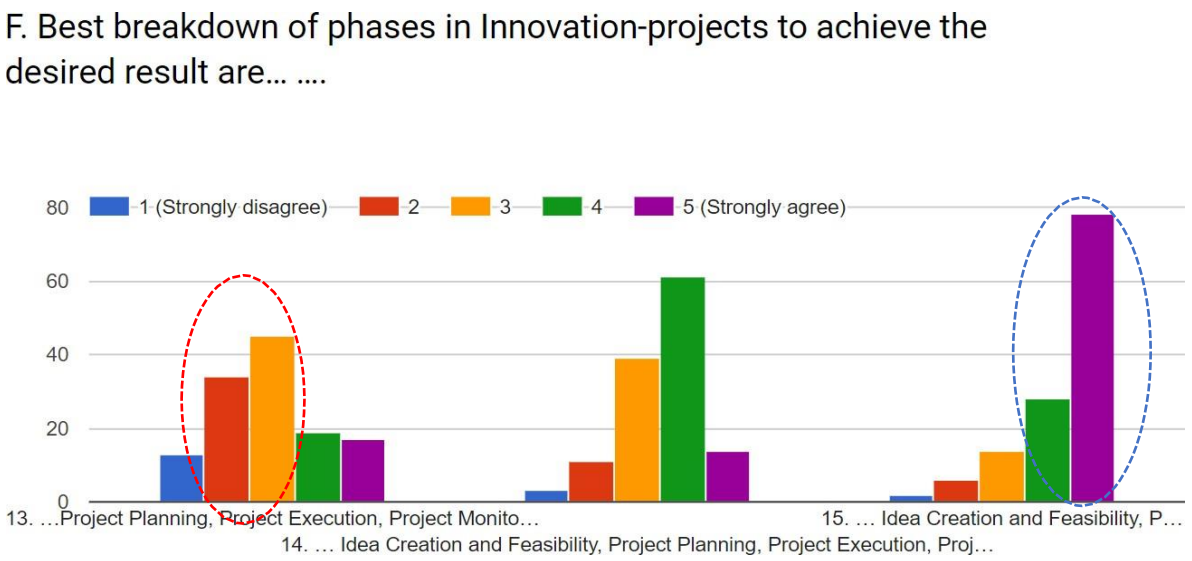

Figure 17. Project Innovation Phases

Still at the model input, looking more at the roles and responsibilities within such project framework. A question was asked about leadership. The majority of respondents (73 of 128) agreed or strongly agreed with the first option that the Project Manager (PM) leads the project work with the Subject Matter Expert (SME) contribution (see figure 18). This was closely followed by the third option that the two PM & SME co-lead the project from start to finish. Whilst the majority of respondents disagreed with the second option that the SME leads the project work with a Project Management Office (PMO) or PM support in the methodology and process.

G. The best innovation-project leadership role would be....

Figure 18. Project Innovation Leadership Role

Looking at the model best organizational structure, a question was asked to understand the best structure. As shown in figure 19, the majority 101 of 128 respondents indicated the fourth option of a matrix structure where R&D, PMO, & NPD are working closely together from the idea creation to final delivery and market assessment is the most suitable setup. Whilst the first option with the existence of an R&D unit in the organization and the total budget investment put into research is voted the least preferable by the respondents.

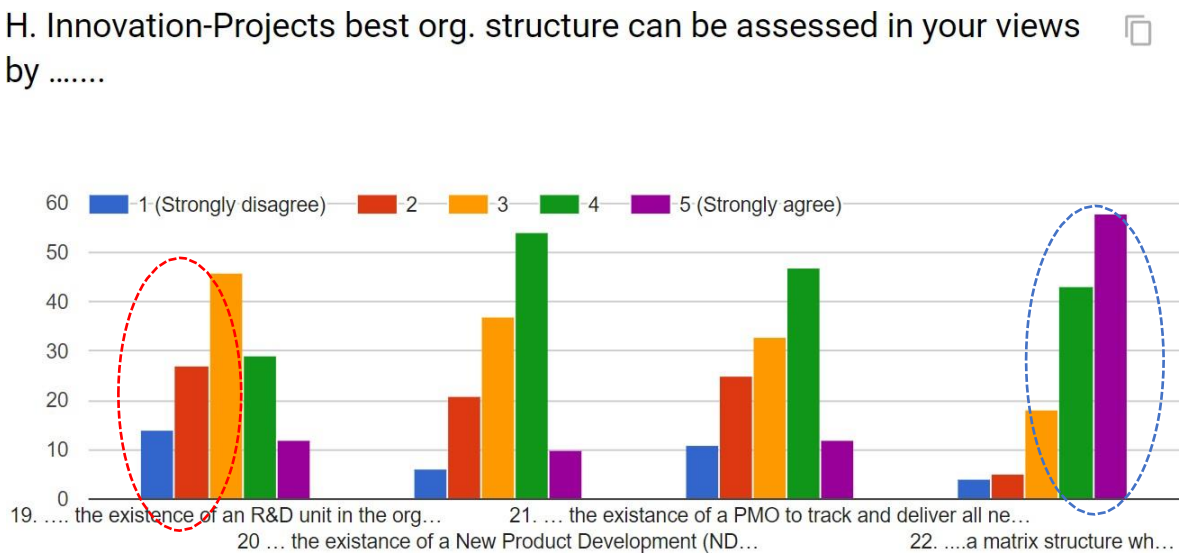

Figure 19. Project Innovation Org Structure

And the final question was on the impact of the model. Going beyond the input and output levels, we covered in the previous questions. As displayed in figure 20, the majority 10 from 128 agreed with the third option that the impact the final deliverable achieved inside the company (Internal) or in the market (External) is the most suitable evaluation matrix. Whilst most disagreed with the first option that proposed the existing traditional way of evaluating projects in most organizations that is to evaluate the compliance of the original cost, time and scope.

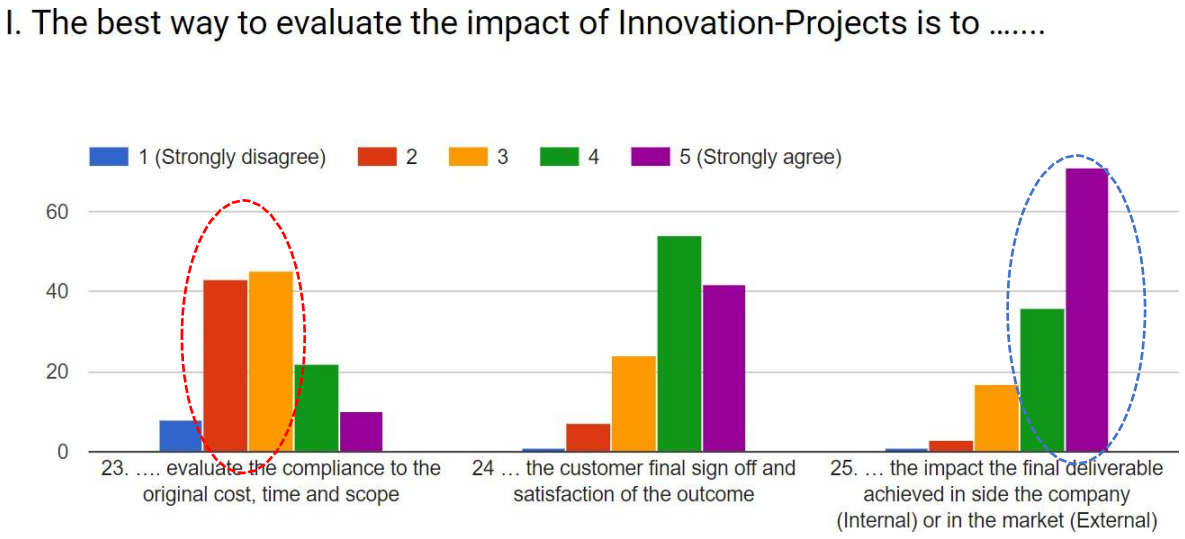

Figure 20. Project Innovation Evaluation

When looking at the above findings from the quantitative-qualitative research work, new organizational structure, processes, roles, and systems to clarify the possible application of the new ProdJect management system within organizations at the different sectors.

The organizational structure of the R&D, which can be called differently depending on the organization e.g. market research or new product development units, is typically looking aftermarket intelligence, scanning and research as well as in few cases the initial development of the concept prototype. The PMOs unit, on the other hand, which can also be called differently like program management, delivery or implementation units, could also be merged within R&D as a new expanded organizational unit named RD&P (Research, Development & Projection), which has the governance accountability for both the market research and development of ideas and concepts as well as the delivery of the final product

and result. With a continuous assessment of the impact the innovation project had on the socio-economic levels to measure its contribution to sustainable development, which is seen as a soft organizational link to the Quality Management System unit in the organization (see figure 21).

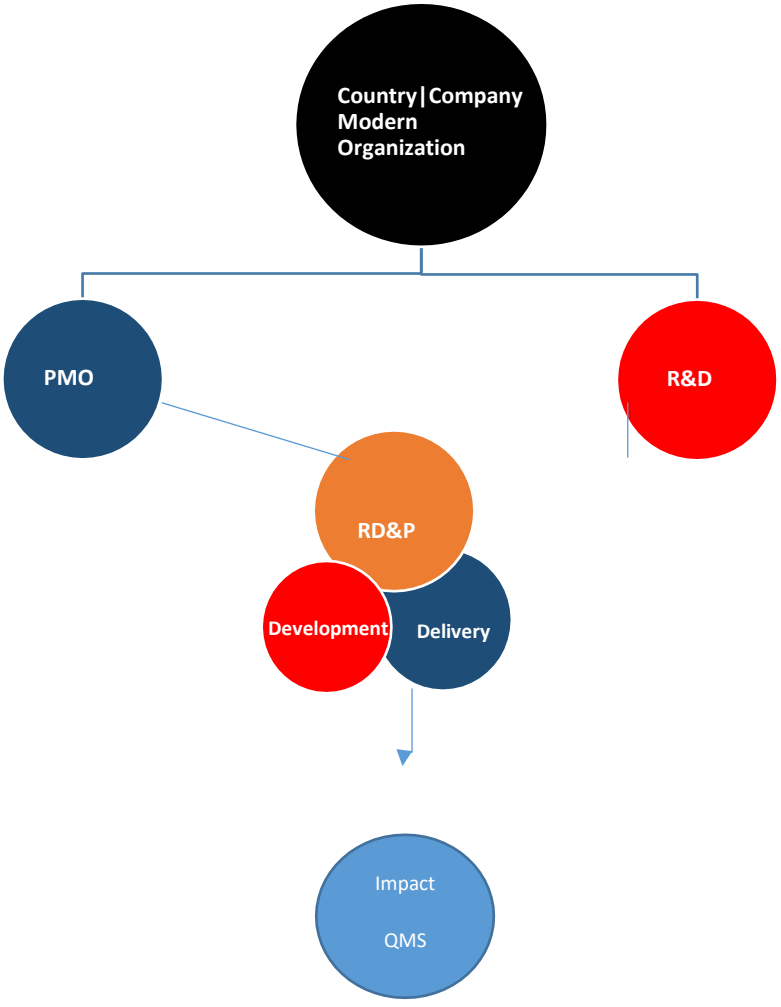

Figure 21. The Prod-Ject New Organizational Design (RD&D)

Due to the exploratory nature of these type of organizational missions, the Prod-Ject proposed management system suggests that each innovation project should be the sponsor or customer-centric i.e. developed progressively together with the customer, and therefore we suggest having **two streams of processes** and activities that are running in parallel:

One eye is on the solution and product development process that integrates and starts from as early as the conception stage at the market research or business development phase, passing to the analysis where further elaboration on the idea is being analyzed with the customer, resulting in a blueprint for what the final product or solution would look like.

It then passes through the progressive creation in the crucial design and development phase that produces a portion of the new product (Alpha, Beta, etc.) with a continuous customer validation and contribution to its creative development process before the deployment phase where the final product or solution is being completed and deployed to the customer.

A new extended final phase of this proposed process is to measure the impact of the final product to the end users or beneficiaries, by going beyond the typical outcome performance indicators like the satisfaction and use of the solution, to the impact, the solution has made to the organization, country or industry.

The second important eye of this proposed Prod-Ject management system is happening in parallel to the above-mentioned development activities to ensure the effective delivery of the product or solution through the project management processes, which in this case starts

its initiation and planning work from as early as the idea conception phase by gathering information, and resources to create a baseline for the project. It then assumes an important communication, marketing, and coordination internally within the different development units and the customer for their visibility and validation throughout each of the development processes.

Following the closure of the project activities at the product or solution handover to the customer, the project in this Prod-Ject model doesn't close its work and continues with measuring the performance of the project focusing on the customer development and creation experience and combining the impact the project deliverable had created for the organization.

And since the Prod-Ject is defined as a management system, the last phases loop back to the start and conception of the following idea, hence creating a continuous improvement and incremental innovation cycles (Kaizens) for the organization as part of the RD&P unit and QMS activities.

To summarize, the Prod-Ject proposed management model changes the traditional waterfall project management processes and activities that are used currently in most organizations influenced by the biggest body of knowledge created by PMI. The following five-summarized areas explain the Prod-Ject model differentiators:

1. It combines the product and solution development with project management processes
2. It assumes the start of any project starts from the ideation/conception stage (and not following) in progressive elaboration
3. It goes beyond the agile development as it mandates that the customer is the gatekeeper for each of its phases
4. It adds a new process phase after project closure and product delivery that is focused on measuring outcomes and impact of the project and product.
5. And finally, this new Prod-Ject model assumes projects are management systems that end it works only temporarily when the product is handed over but continues in reality within the organizational boundaries and beyond through the impact assessment work that contributes to the incremental product innovation and project performance over time in a system dynamic way.

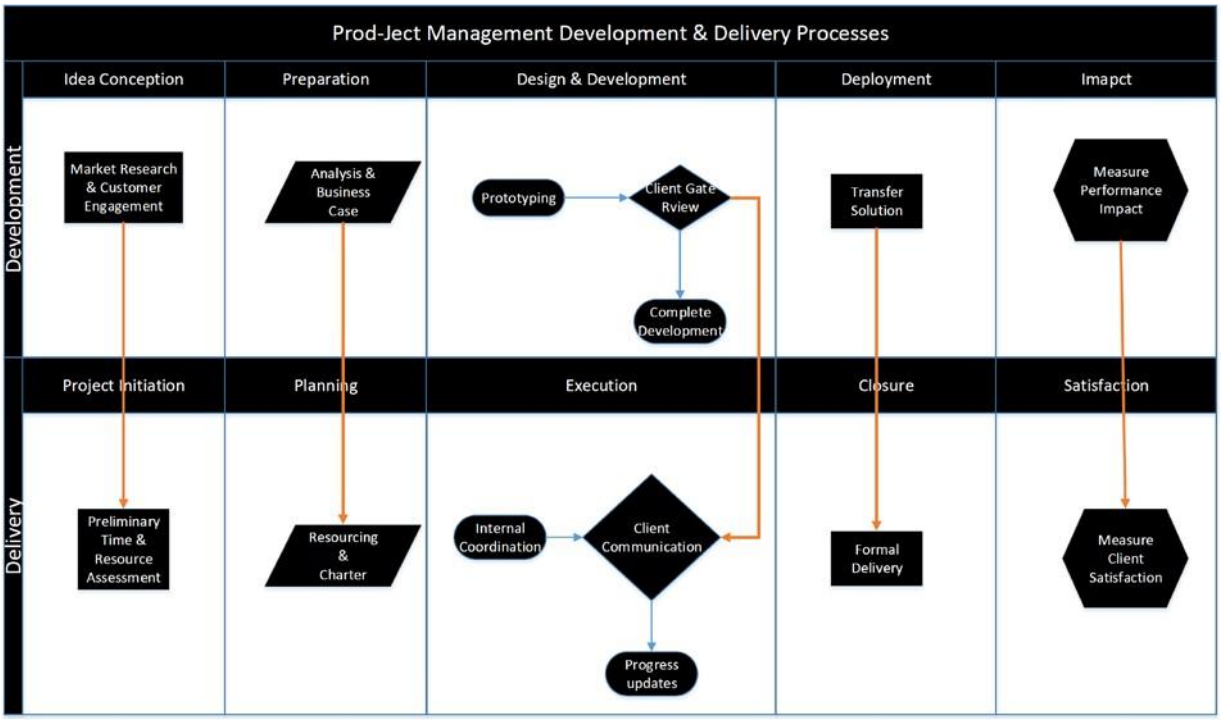

Figure 22. Prod Ject management Process Model

As shown in figure 22, the five-proposed process changes in the Prod-Ject management system triggers the need to also rethink the traditional **role of the Project Manager (PM)**. In typical Waterfall and even in Agile projects, the PM is assumed to be the one leading the troops (Resources from the different organizational areas) to deliver the final solution to the customer on time, scope and budget.

However, this traditional PM role may not fit in the development and innovation type of projects using the Prod-Ject proposed model since it looks for combining ideation and development expertise as well as project competencies. And therefore the Prod-Ject

Management System suggests a complimentary style leadership with a co-pilot principle (Similar to when flying an airplane) that makes each project starts with two Prod-Ject leaders:

One who leads the product development, responsible for the solution specification, quality, and impact, and a second co-pilot as the project lead that looks after the resource planning, coordination, and overall client communication together with the product lead. The Prod—Ject team reports in a matrix to both the project lead for areas such as resource usage, timelines and scope deliverable, while they report to the product lead for the design, development specification and quality of production.

As shown in the figure 23, the two leads coordinate in co-pilot approach with the customer, where the project lead communicate on the overall scope progression, next steps, timing, and budget, while the product lead speaks to the customer about the progressive creation of the product or solution specification, all the way from its starting prototype, to its alpha, beta and gold stages. The two leads also ensure knowledge transfer to the team and client and the business continuity, especially that such project and development take time and therefore has some more unknown risks in comparison to the widely used traditional pre-scoped and pre-defined projects.

Figure 23. The Prod-Ject Management Roles

At the **system level**, the Prod-Ject management system assumes a system integration between the idea conception, marketing or customer relationship management system (CRM) where new business development leads and initial concepts are usually kept, together with project management delivery systems such as the Microsoft Project Server, and the outcome of both then creates the KPIs for the RD &P balanced scorecard that measures the prod-Ject outputs, outcomes, and impact (see figure 24).

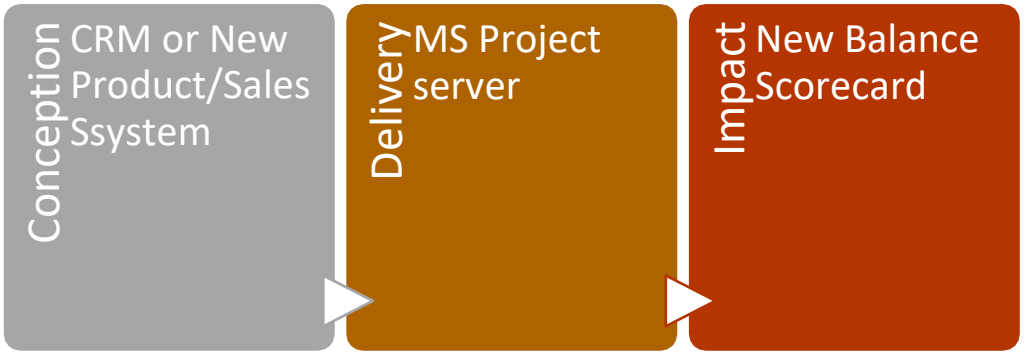

Figure 24. The Prod-Ject Management System tools

Finally, to illustrate the importance of pursuing with our proposed theoretical (Pro-Innova) and management (Prod-Ject) framework, it is worth looking at the case of IBM in 1999, they had failed to take to market some new and potential technological product like the commercial router that was originally created by IBM yet Cisco was the one who succeeded in commercializing it within the global markets. In IBM reflection about this case, it found the lack of effective and agile execution with short-term orientation on existing products and market share. The company realized the need for a specific governance and process to enable this idea-to-market cycle. IBM launched the Emerging Business Organization—EBO (O'Reilly et al., 2009). After seeing the impact of such new organization with approximately $25 million since 2000, the organization has lately developed a new innovation project process known as jStart (see figure 25) with the ultimate goal to improve their idea-to-market cycle with a motto and designed processes to "Start Small, and grow fast" with the customer always in mind (IBM, 2016).

Figure 25. Start Small, and grow fast (IBM jStart, 2016)

5. Discussion and conclusions

Till now, very limited research was done to study the relationship between project and innovation within organizations, the three most notable studies were by Hobbs, Aubry, & Thuillier, 2008; Martinsuo, Hensman, Arto, & Kujalo, 2006; Thomas, Williams, Cicmil, & Mullaly; 2010. They have not specified a model for how modern organizations could practically apply a new management system that will allow them to create new value while still delivering with agility.

On the one hand, project fail rate could be largely attributed to the state of mind of many organizations that approach new projects trying to predict all its details (scope, time, cost and stakeholders) from the conception stage, not sighting several unknown variables in an increased organizational complexity (Matta & Ashkenas, 2003). And on the other hand, innovation failure could be reasoned to organizations vague approach that tend to focus only on the creative part with neglecting taking it to the realization stage.

Our Pro-Innova & ProdJect frames provide flexibility and structure to navigation fluidly through complexity. Especially in exploratory innovative journeys when little information is known about the project.

Our new theory is emerging to challenge traditional project processes and organization as well as the definition of innovation management system by attempting to design-think the innovation and the project systems, phases and activities (Albaidhani, Romero, 2018). The

new research argued and proposed new theoretical models, using some aspects of the system dynamics loops to move away from the waterfall sequential process blocks that could limit our ability to imagine and paint a new framework of project collaboration through the use of the process ontology (Chia, 1997; Rescher, 2012). The focus of the proposed theory was to analyze the complementary and shared traits found in both areas (Innovation and Project) to address the challenges, limitations, contradictions as well as the complexity each area has on its own.

Our research identified a unique area within projects that were rarely discussed in research that is when organizations are managing vague, ambitious, and outside the box exploration missions with little clarity on the scope, timeline, and resources. As shown in Figure 6, our proposed Pro-Innova framework is best at used when the degree of originality in the innovation ideation is very high, while the discipline and agility for project implementation are also high.

The formula Pro-Innova proposed is simplified in that the increased frequency of new ideas created multiplied by the agile ability to deliver them will result in a greater impact:

Increased Idea creation (y) X Agile Project delivery (z) = Greater Pro-Innova impact (Δ yz)

Instead of following a streamlined set of processes as proposed in traditional project management, which aims at reducing variation and failure, the Pro-Innova and its ProdJect

model creates a fluid yet framed environment that allows for increased variation, failures and therefore an eventual high impact success.

The research and proposed theoretical model Pro-Innova creating a full cycle from purpose to impact in order to help analyze the interrelation between innovations and projects shows that Pro-Innova is a framework that could potentially aid innovators in their struggle to materialize their ideation cycle while assist project leaders to make sense of their delivery work. The model attempts to assist the organization at the macro level to balance the forces from the two polar disciplines within the organization, industry, and country. The Pro-Innova tries to break down the complexity by bringing between the two areas of the idea creation and project implementation with a special look at 3Cs:

- Creation of new concepts and ideas

- Coordination within the organization to deliver in an effective and efficient manner &

- Communication and engage with all the internal and external industry or global stakeholders for a higher impact with success.

The empirical research revealed that the Pro-Innova model mains two variables (idea creation & Project delivery) are actually linked and could be considered. A new and more practical management system ProdJect was also unleashed that detailed how ProInova could be

operated with detailed processes, systems, roles and organizational design. The ProdJect management system offered a detailed and comprehensive purpose-to-impact cycle, offering a new and unique evaluation model for the ProI-nnova ProdJect type of projects that looks at effectiveness, relevance, and overall sustainability instead of focusing on limited aspects of work such as time, cost and scope.

Pro-Innova and ProdJect findings could be considered as a process innovation that is aimed to help with product innovation to maximize its impact (Lee & Schmidt, 2017).). It is also important to note that the proposed ProdJect management system that covers the propose-to-impact cycle will need to be further studied when it comes to its third variable (Impact) in the case of success criteria. The survey research finding unleashed that customer/user satisfaction has a heavier weight than the long-term impact that the model proposed.

Another modification to the model will be in its proposed way of project implement newly created ideas. The findings suggest that a more modular, phase-based approach with using pilot experimentation with a select group of users is more appropriate than going into a fully fledged project delivery model which could be resource-risky if the implementation reveals some potential gaps in the original idea.

It was also observed from the interviews, case observations and survey result that the ProdJect framework while proven to be generally gaining consensus across the studied and surveyed sectors & regions as a framework for exploration types of projects that are intended to create unique outcomes that impact for the long term, it nonetheless shouldn't

be seen as a “one-size fits all” principle. A careful modification by interpreting the model and how it could best fit the industry or country it will be used for. One example we noticed is while interviewees and survey participants agreed on the link between the two areas, they sometimes interpreted the link differently. This was also confirmed by the ethnographic case observations when innovation projects were used differently between the aviation case that sought to strengthen its organizational project delivery position by engaging the user in the initial thinking and idea creation process, and the case of standard development where creative ideas was the theme of the organization and ProdJect is seen as a tool to complete the materialization of the idea through the agile project delivery. The demographics of the survey respondents (e.g. their role, project management experiences, industry, project scope, and size.etc.) while on aggregated agreed with the Pro-Innova and Prodject Management Systems, it also showed some variation in the perception based on their background and profile (See table 1).

The empirical research revealed that the ProdJect Management System two variables (idea creation & Project delivery) are actually linked and could be considered. However, it is worth noting that major work is still required to be further studied when it comes to its third variable (Impact) in the case of success criteria. The survey research finding unleashed that customer/user satisfaction has a heavier weight than the long-term impact that the model proposed.

Another modification to the model will be in its proposed way of project implement newly created ideas. The findings suggest that a more modular, phase-based approach with using

pilot experimentation with a select group of users is more appropriate than going into a fully fledged project delivery model which could be resource-risky if the implementation reveals some potential gaps in the original idea.

raphic	Av Chall	Av Chall	Av Chal	Av Link	Av Link	Av Lin	Av Lin	Av IP_Crit	Av IP_Crit	Av IP_Crit	Av Ena	Av Ena	Av IP_Succ	Av IP_Suc	Av IP_Succ	Av IP_Pha	Av IP_Pha	Av IP_Pha	Av IP_Lead	Av IP_Lead	Av IP_Lead	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Eval	Av IP_Eval	Av IP_Eval
	2.7	3.0	3.5	2.7	1.7	3.7	2.0	2.7	3.3	3.7	4.3	4.0	3.3	3.3	3.7	3.0	3.7	4.0	2.3	2.7	3.3	3.0	3.0	2.7	3.7	2.7	3.3	3.0
	3.8	4.0	4.1	2.4	4.3	3.9	1.9	3.0	4.1	4.4	4.6	3.4	3.7	3.3	4.0	2.4	3.1	4.6	2.6	3.1	4.1	3.0	3.0	3.0	4.0	2.6	4.1	4.0
	3.3	3.7	4.0	3.3	4.3	3.0	2.3	2.3	4.7	4.0	4.7	2.7	3.3	3.7	3.0	3.0	3.3	4.3	3.7	3.3	4.0	3.0	3.7	3.7	3.7	2.3	3.7	4.7
ons	4.8	3.8	3.4	2.0	4.4	4.4	1.8	3.2	4.6	4.8	5.0	3.6	3.4	3.6	4.0	3.0	3.6	4.8	4.0	2.8	4.0	3.2	3.0	3.6	3.8	3.0	4.0	5.0
	3.5	3.2	3.2	2.5	3.6	3.8	2.0	3.4	4.2	4.3	4.4	2.8	3.3	3.7	3.9	2.6	3.2	4.3	3.8	2.8	3.8	2.7	3.4	3.6	4.5	2.3	3.6	4.3
Marketing	3.3	3.7	4.1	2.8	3.8	4.3	3.0	3.0	4.8	4.3	4.6	3.3	3.9	4.0	3.9	3.0	3.9	4.5	3.6	3.8	3.6	3.4	3.3	3.4	4.3	3.5	4.1	4.4
ployed	3.0	3.0	3.7	2.1	4.3	4.4	2.0	3.9	4.7	4.7	4.9	3.6	3.6	3.9	4.1	2.7	3.7	4.9	3.9	3.3	3.3	3.1	3.4	3.0	4.4	3.0	4.4	4.6
t				2.0	3.8	3.8	2.2	3.5	3.5	3.8	4.0	3.3	3.5	3.3	3.5	2.7	3.7	3.8	4.0	2.8	3.3	2.7	3.5	2.8	3.7	3.2	3.8	4.0
r/professor	4.1	3.3	2.9	3.1	3.5	3.9	1.9	3.0	4.5	4.0	4.6	3.4	3.5	3.6	4.4	3.4	3.4	4.5	4.0	2.9	3.6	3.5	3.4	3.4	3.6	2.8	3.6	4.8
otal	**3.6**	**3.4**	**3.6**	**2.5**	**3.8**	**4.0**	**2.1**	**3.2**	**4.3**	**4.3**	**4.6**	**3.3**	**3.5**	**3.6**	**3.9**	**2.8**	**3.5**	**4.4**	**3.6**	**3.1**	**3.7**	**3.1**	**3.3**	**3.3**	**4.1**	**2.8**	**3.9**	**4.3**

aphic	Av Chal	Av Chall	Av Chal	Av Lin	Av Link	Av Link	Av IP_Crit	Av IP_Crit	Av IP_Crit	Av Ena	Av Ena	Av Ena	Av IP_Suc	Av IP_Suc	Av IP_Suc	Av IP_Phas	Av IP_Phas	Av IP_Phas	Av IP_Lead	Av IP_Lead	Av IP_Lead	Av IP_Org	Av IP_OrgS	Av IP_Org	Av IP_Org	Av IP_Eva	Av IP_Eval	Av IP_Eval
ia & Education	4.1	3.1	3.4	2.4	3.8	3.9	2.1	3.3	4.1	4.1	4.5	3.4	3.4	3.6	4.0	3.1	3.6	4.2	3.9	3.1	3.6	3.2	3.4	3.3	3.8	2.9	3.7	4.3
ing	3.6	3.4	4.0	2.6	3.4	4.0	2.4	3.3	4.3	4.1	4.5	2.5	3.3	3.8	3.8	2.6	3.3	4.4	3.6	3.1	3.6	3.3	3.5	3.4	4.1	2.8	4.3	4.3
& Mining	3.0	2.0	2.0	3.0	2.0	2.0	1.0	2.0	3.0	2.0	3.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	3.0	2.0	1.0	2.0	2.0	3.0	2.0	2.0	3.0
l	4.0	5.0	4.0	3.0	5.0	4.0	2.0	4.0	4.0	4.0	4.0	5.0	3.0	3.0	4.0	3.0	4.0	5.0	3.0	4.0	5.0	4.0	5.0	2.0	3.0	3.0	5.0	4.0
ment & Public	3.7	3.3	3.0	2.7	2.7	3.7	2.3	3.0	5.0	4.3	5.0	4.0	3.3	4.0	4.0	2.7	3.7	5.0	3.0	3.7	4.7	3.3	3.7	3.3	3.3	2.3	3.7	4.7
	5.0	3.0	4.5	2.0	4.5	3.5	2.5	3.5	4.5	5.0	5.0	3.0	4.0	3.5	4.5	1.5	3.5	5.0	3.0	3.0	3.5	3.5	3.5	3.5	4.0	2.0	4.5	4.0
tional Organization	3.8	4.0	4.3	2.8	4.3	3.5	2.5	3.3	4.5	4.3	4.5	3.8	4.3	4.3	3.3	2.5	2.8	5.0	2.8	3.0	3.8	2.8	2.8	3.8	4.3	2.8	3.8	4.5
onal Association	1.0	3.0	2.0	2.5	4.0	4.5	2.0	3.5	4.5	4.0	4.0	3.0	4.0	3.0	5.0	4.0	4.0	5.0	4.5	4.5	4.0	3.5	3.5	3.5	5.0	3.0	3.5	4.0
Transportation	3.5	3.5	3.5	2.5	4.0	4.2	2.0	3.1	4.3	4.4	4.7	3.3	3.6	3.6	3.9	2.9	3.5	4.4	3.7	2.8	3.6	2.9	3.2	3.2	4.3	2.9	3.9	4.4
otal	**3.6**	**3.4**	**3.6**	**2.5**	**3.8**	**4.0**	**2.1**	**3.2**	**4.3**	**4.3**	**4.6**	**3.3**	**3.5**	**3.6**	**3.9**	**2.8**	**3.5**	**4.4**	**3.6**	**3.1**	**3.7**	**3.1**	**3.3**	**3.3**	**4.1**	**2.8**	**3.9**	**4.3**

raphi	Av Chall	Av Chall	Av Chal	Av Lin	Av Lin	Av Lin	Av Lin	Av IP_Cri	Av IP_Cri	Av IP_Cri	Av Ena	Av Ena	Av IP_Suc	Av IP_Succ	Av IP_Suc	Av IP_Pha	Av IP_Pha	Av IP_Pha	Av IP_Lea	Av IP_Lea	Av IP_Lea	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Eva	Av IP_Eval	Av IP_Eva
rs	3.5	3.4	3.5	2.6	3.7	3.9	2.2	3.0	4.2	4.3	4.6	3.0	3.1	3.7	3.7	2.8	3.4	4.2	3.7	3.1	3.5	3.1	3.6	3.1	4.1	2.8	4.0	4.2
rs	3.0	3.3	3.4	1.8	3.8	3.9	1.9	3.4	3.9	3.9	4.2	2.9	3.3	3.3	4.1	2.4	3.4	4.5	3.8	2.8	3.3	2.6	3.3	3.1	4.0	2.8	3.7	3.9
rs	3.3	3.3	3.6	2.8	3.2	3.7	2.7	3.3	4.2	3.8	4.5	3.5	4.0	3.3	3.8	2.5	3.3	4.2	3.0	2.3	3.8	3.0	3.0	3.2	4.0	3.2	3.7	4.0
ars	4.3	3.6	3.9	2.6	4.2	4.2	1.8	3.2	4.7	4.5	4.8	3.5	4.0	4.0	4.1	3.1	3.6	4.7	3.7	3.4	4.1	3.1	3.0	3.7	4.2	2.8	4.0	4.8
erience	1.0	2.0	1.0	4.3	3.7	3.7	2.7	3.7	4.7	4.7	5.0	4.3	4.0	3.3	4.3	3.7	3.7	4.7	3.7	3.7	4.3	4.7	4.0	3.0	3.3	2.7	3.7	5.0
Total	**3.6**	**3.4**	**3.6**	**2.5**	**3.8**	**4.0**	**2.1**	**3.2**	**4.3**	**4.3**	**4.6**	**3.3**	**3.5**	**3.6**	**3.9**	**2.8**	**3.5**	**4.4**	**3.6**	**3.1**	**3.7**	**3.1**	**3.3**	**3.3**	**4.1**	**2.8**	**3.9**	**4.3**

graphic	Av Chall	Av Chall	Av Chal	Av Lin	Av Lin	Av Lin	Av Lin	Av IP_Cri	Av IP_Crit	Av IP_Crit	Av Ena	Av Ena	Av IP_Succ	Av IP_Succ	Av IP_Succ	Av IP_Pha	Av IP_Pha	Av IP_Pha	Av IP_Lea	Av IP_Lead	Av IP_Lea	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Eval	Av IP_Eval	Av IP_Eval
0 - $50,000	2.8	2.7	3.0	2.5	3.8	4.2	2.2	3.5	4.1	4.2	4.3	3.2	3.8	3.3	3.8	2.8	3.5	4.4	3.8	3.0	3.6	3.0	3.3	3.2	4.1	3.0	3.8	4.2
000 - $500,000	3.1	3.3	4.1	2.4	3.3	3.6	2.1	3.5	3.9	4.0	4.5	3.3	3.6	3.4	3.8	2.6	3.4	4.4	2.9	2.6	3.3	3.4	3.5	3.1	3.5	2.8	3.9	3.5
00 - $150,000	3.8	3.3	3.6	3.3	3.7	4.0	2.5	3.2	4.6	4.2	4.9	3.2	3.5	3.4	4.4	3.0	3.4	4.5	3.9	3.0	3.7	3.4	3.4	3.3	4.3	3.2	3.7	4.9
000 - $1 million	4.0	3.8	3.8	2.2	4.2	4.3	2.0	2.9	4.7	4.5	4.7	3.4	3.4	4.0	4.0	2.9	3.7	4.6	3.6	3.1	4.1	2.6	3.1	3.7	4.1	2.8	3.9	4.6
illion	3.8	3.6	3.4	2.4	3.8	3.8	1.9	3.0	4.3	4.3	4.5	3.3	3.4	3.9	3.7	2.8	3.4	4.4	3.7	3.3	3.7	3.0	3.3	3.2	4.1	2.5	4.0	4.3
Total	**3.6**	**3.4**	**3.6**	**2.5**	**3.8**	**4.0**	**2.1**	**3.2**	**4.3**	**4.3**	**4.6**	**3.3**	**3.5**	**3.6**	**3.9**	**2.8**	**3.5**	**4.4**	**3.6**	**3.1**	**3.7**	**3.1**	**3.3**	**3.3**	**4.1**	**2.8**	**3.9**	**4.3**

vChall	Av Chal	Av Chall	Av Lin	Av Lin	Av Lin	Av Lin	Av IP_Cri	Av IP_Cri	Av IP_Cri	Av Ena	Av Ena	Av IP_Succ	Av IP_Suc	Av IP_Suc	Av IP_Pha	Av IP_Pha	Av IP_Pha	Av IP_Lea	Av IP_Lea	Av IP_Lea	Av IP_Org	Av IP_Org	Av IP_OrgS	Av IP_Org	Av IP_Eva	Av IP_Eva	Av IP_Eval
3.6	3.5	3.5	2.5	3.8	4.0	2.1	3.1	4.4	4.3	4.6	3.4	3.5	3.8	3.9	2.8	3.5	4.4	3.7	2.9	3.6	3.0	3.3	3.3	4.2	2.9	3.8	4.5
3.7	3.3	3.6	2.6	3.8	3.9	2.1	3.4	4.2	4.3	4.4	3.1	3.6	3.3	4.0	2.8	3.4	4.5	3.5	3.4	3.8	3.2	3.3	3.3	3.9	2.7	4.0	4.1
3.6	**3.4**	**3.6**	**2.5**	**3.8**	**4.0**	**2.1**	**3.2**	**4.3**	**4.3**	**4.6**	**3.3**	**3.5**	**3.6**	**3.9**	**2.8**	**3.5**	**4.4**	**3.6**	**3.1**	**3.7**	**3.1**	**3.3**	**3.3**	**4.1**	**2.8**	**3.9**	**4.3**

all	Av Chal	Av Chall	Av Lin	Av Lin	Av Lin	Av Lin	Av IP_Crit	Av IP_Crit	Av IP_Crit	Av Ena	Av Ena	Av IP_Suc	Av IP_Suc	Av IP_Suc	Av IP_Pha	Av IP_Pha	Av IP_Pha	Av IP_Lea	Av IP_Lea	Av IP_Lea	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Eva	Av IP_Eva	Av IP_Eval
3.3	3.0	3.8	2.3	3.7	4.3	2.4	3.7	4.1	4.6	4.9	3.4	3.9	3.7	4.0	2.7	3.6	4.3	4.0	2.7	3.9	3.6	3.6	2.9	4.3	2.9	4.3	4.4
3.7	3.5	3.6	2.6	3.8	3.9	2.1	3.1	4.3	4.2	4.5	3.3	3.5	3.6	3.9	2.8	3.5	4.5	3.6	3.1	3.7	3.0	3.3	3.3	4.0	2.8	3.8	4.3
3.6	**3.4**	**3.6**	**2.5**	**3.8**	**4.0**	**2.1**	**3.2**	**4.3**	**4.3**	**4.6**	**3.3**	**3.5**	**3.6**	**3.9**	**2.8**	**3.5**	**4.4**	**3.6**	**3.1**	**3.7**	**3.1**	**3.3**	**3.3**	**4.1**	**2.8**	**3.9**	**4.3**

	Av Chal	Av Chal	Av Chall	Av Lin	Av Lin	Av Lin	Av Lin	Av IP_Cri	Av IP_Cri	Av IP_Cri	Av Ena	Av Ena	Av IP_Suc	Av IP_Suc	Av IP_Suc	Av IP_Pha	Av IP_Pha	Av IP_Pha	Av IP_Lea	Av IP_Lea	Av IP_Lea	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Eval	Av IP_Eva	Av IP_Eva
ame contry	3.1	3.1	3.4	2.6	3.5	3.9	2.1	3.2	4.1	4.2	4.4	3.2	3.4	3.2	4.1	3.0	3.5	4.3	3.5	3.1	3.5	3.3	3.3	3.1	3.7	2.8	3.8	4.1
/or global i	3.9	3.6	3.7	2.5	4.0	4.0	2.1	3.2	4.4	4.3	4.7	3.3	3.6	3.9	3.8	2.7	3.5	4.5	3.7	3.1	3.8	2.9	3.3	3.4	4.3	2.8	3.9	4.5
	3.6	**3.4**	**3.6**	**2.5**	**3.8**	**4.0**	**2.1**	**3.2**	**4.3**	**4.3**	**4.6**	**3.3**	**3.5**	**3.6**	**3.9**	**2.8**	**3.5**	**4.4**	**3.6**	**3.1**	**3.7**	**3.1**	**3.3**	**3.3**	**4.1**	**2.8**	**3.9**	**4.3**

Demographic	Av Chall	Av Chall	Av Chall	Av Lin	Av Lin	Av Lin	Av Lin	IP_Cri	Av IP_Cri	Av IP_Cri	Av Ena	Av Ena	IP_Suc	Av IP_Succ	Av IP_Suc	Av IP_Pha	Av IP_Pha	Av IP_Pha	Av IP_Lea	Av IP_Lea	Av IP_Lea	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Org	Av IP_Eva	Av IP_Eva	Av IP_Eva
AE - United Arab Emirates	3.0	2.0	2.0	3.0	2.0	2.0	1.0	2.0	3.0	2.0	3.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	3.0	2.0	1.0	2.0	2.0	3.0	2.0	2.0	3.0
AT— Austria	2.0	4.0	2.0	2.0	3.0	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	3.0	2.0	2.0	5.0	4.0	2.0	2.0	2.0	2.0	4.0	4.0	2.0	3.0	4.0
AU —Australia	2.5	2.5	2.0	5.0	2.5	3.0	1.0	3.5	5.0	4.5	4.5	3.5	2.5	3.5	4.0	2.5	2.5	5.0	3.0	2.5	4.5	4.0	3.5	2.5	2.5	1.5	3.5	5.0
CA— Canada	4.5	4.0	3.8	2.5	4.5	4.3	1.7	2.3	4.5	4.3	4.5	2.7	3.0	3.8	4.3	3.2	3.7	4.7	4.2	2.3	3.7	2.7	2.5	3.3	4.3	3.3	4.2	4.8
Canada				2.3	4.6	4.1	1.9	3.7	4.3	4.4	4.7	3.6	3.9	3.9	4.1	3.0	4.1	4.6	4.4	3.3	3.9	3.3	3.9	3.3	4.4	3.3	4.1	4.7
CH— Switzerland	3.6	3.2	3.6	2.2	3.6	3.8	2.6	2.9	4.6	4.4	4.7	3.5	3.5	3.8	3.7	2.5	3.2	4.5	3.5	3.1	4.0	2.8	3.4	3.5	4.2	2.7	3.6	4.4
China				1.0	1.0	1.0	3.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CI — Cote d'Ivoire	4.0	5.0	4.0	2.0	2.0	4.0	3.0	3.0	3.0	5.0	5.0	1.0	3.0	4.0	3.0	4.0	3.0	2.0	3.0	3.0	5.0	5.0	4.0	3.0	4.0	3.0	5.0	4.0
ES— Spain	4.0	3.0	4.5	3.0	4.5	3.0	1.0	3.5	4.5	4.5	4.5	2.0	3.0	3.0	4.0	2.5	4.0	5.0	3.0	5.0	4.0	3.5	3.5	3.5	5.0	2.5	4.0	4.0
FR— France	4.0	5.0	4.0	3.0	5.0	4.0	2.0	4.0	4.0	4.0	4.0	5.0	3.0	3.0	4.0	3.0	4.0	5.0	3.0	4.0	5.0	4.0	5.0	2.0	3.0	3.0	5.0	4.0
GB— United Kingdom	4.0	4.0	3.0	2.5	3.0	4.5	3.0	2.5	4.5	4.0	4.5	2.5	3.5	3.5	3.0	3.5	3.0	3.0	3.0	3.5	2.5	2.5	2.5	2.0	4.5	3.0	4.0	4.0
IE— Ireland	4.0	5.0	4.0	3.0	4.0	4.0	2.0	4.0	4.0	5.0	5.0	3.0	4.0	3.0	4.0	4.0	4.0	4.0	5.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0	5.0	5.0
IT— Italy	4.0	3.0	3.0	5.0	5.0	5.0	1.0	5.0	5.0	5.0	5.0	3.0	4.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	5.0	2.0	3.0	4.0	5.0	3.0	4.0	5.0
JO— Jordan	5.0	4.0	4.0	2.0	3.0	4.0	4.0	4.0	4.0	5.0	5.0	4.0	5.0	3.0	4.0	2.0	4.0	5.0	4.0	2.0	5.0	2.0	4.0	4.0	5.0	2.0	4.0	5.0
NL— Netherlands	5.0	5.0	5.0	3.0	5.0	5.0	2.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	3.0	2.0	4.0	5.0	3.0	5.0	4.0
OM— Oman	3.0	5.0	4.0	5.0	4.0	5.0	3.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	5.0	4.0	3.0	5.0	4.0	4.0	5.0	5.0	4.0	5.0
QA - Qatar	2.0	4.0		2.0	2.0	5.0	1.0	3.0	4.0	4.0	5.0	5.0	4.0	4.0	4.0	2.0	3.0	5.0	2.0	2.0	5.0	4.0	3.0	3.0	5.0	3.0	5.0	3.0
RU— Russia	5.0	2.0	2.0	3.0	4.0	4.0	3.0	3.0	4.0	5.0	5.0	4.0	5.0	3.0	3.0	2.0	2.0	5.0	3.0	1.0	4.0	3.0	3.0	4.0	5.0	3.0	3.0	5.0
SA —Saudi Arabia	1.0	3.0	2.0	2.0	3.0	5.0	2.0	4.0	4.0	3.0	3.0	3.0	4.0	3.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0	3.0	4.0	4.0	5.0	3.0	3.0	3.0
SE— Sweden	3.0	3.0	3.5	2.0	3.5	4.5	1.5	4.5	4.0	4.0	4.5	3.0	3.5	2.5	4.5	2.0	3.5	5.0	3.0	3.0	2.5	3.5	4.0	4.0	4.0	3.0	4.5	3.0
SG— Singapore	4.0	3.3	3.8	2.8	4.5	4.0	2.3	3.5	5.0	4.0	5.0	3.0	3.5	4.3	3.5	3.3	3.5	4.5	4.3	3.5	3.3	4.0	3.8	3.3	2.8	2.0	3.8	5.0
SL— Sierra Leone	4.0	4.0	5.0	1.0	4.0	4.0	3.0	3.0	4.0	3.0	4.0	4.0	5.0	5.0	5.0	4.0	5.0	4.0	5.0	5.0	4.0	3.0	4.0	5.0	4.0	4.0	4.0	4.0
TR —Turkey	2.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
US— United States	3.5	2.5	3.8	2.5	3.8	4.3	2.3	3.5	4.5	5.0	5.0	3.8	3.5	4.3	4.3	3.3	4.3	4.8	3.8	3.5	3.5	2.8	3.0	3.0	4.0	2.3	4.3	4.5
ZA— South Africa	2.0	4.0	4.0	4.0	5.0	5.0	1.0	3.0	5.0	5.0	5.0	1.0	3.0	1.0	5.0	3.0	3.0	5.0	1.0	3.0	5.0	3.0	3.0	3.0	5.0	4.0	4.0	5.0
(blank)	4.0	5.0	5.0	1.0	4.0	4.0	1.0	2.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	1.0	3.0	5.0	5.0	1.0	1.0	3.0	5.0	3.0	5.0	5.0	5.0	5.0
Grand Total	**3.6**	**3.4**	**3.6**	**2.5**	**3.8**	**4.0**	**2.1**	**3.2**	**4.3**	**4.3**	**4.6**	**3.3**	**3.5**	**3.6**	**3.9**	**2.8**	**3.5**	**4.4**	**3.6**	**3.1**	**3.7**	**3.1**	**3.3**	**3.3**	**4.1**	**2.8**	**3.9**	**4.3**

CHAPTER 5

PROJECTS WITH PURPOSE (PP) = INNOVATION WITH IMPACT (II) EXAMINING TECHNOLOGICAL AND SOCIAL INNOVATION PROJECTS THIRD ARTICLE:

Accepted in the June 2019 edition of the International Journal of Arts and Sciences' (IJAS) Conference hosted by McGill University, the article "Projects with Purpose (Pp.) = Innovation with Impact (Ii.), Examining Technological and Social Projects" is presented in such a way to allow for the Prodject Management System to be tested in two case studies format. One case is focused on the technological innovation projects while the second is examining the social innovation type of projects.

Examining technological and social innovation projects

Abstract

Through the lenses of two case studies from the aviation (Technology) and trade (Social) sectors, we examine the relationship between innovation cycles and project phases in two different project context: technological and social innovation. The cases reveal some important findings to illustrate the importance of creating a strong purpose for projects, which ultimately create innovations that have social and economic impacts. Artto & Wikstrom (2005) looked into the economics of projects by evaluating the product development, the research and development (R&D) cycles in businesses and their relation to projects and project management. Our paper aims to further expand into this research

area by examining the relationship between projects and innovations at the field within organizations.

1. Introduction

Projects have been undergoing a wide range of standardization attempts from the work of organizations with deep roots in engineering, defence and production such as the Project Management Institute (PMI), the International Organizations for Standardization (ISO), PRojects IN Controlled Environments (PRINCE2) and many others. These standardization initiatives have created a wide misperception within the professional world that the way projects should be managed is a "one-size-fits-all" approach, and therefore their success became very much linked to the "How" question of the project e.g. time, scope and cost triangle, than the important "Why" question.

This paper looks at projects from a different perspective than a standardized process in a production and controlled environment. It looks at exploratory project journeys that are adaptive in nature, and aimed for creating something innovative that is truly unique and not repetitive. Therefore, the paper addresses the "Why" question of projects, by trying to understand the purpose for what the project is deployed to do, which in turn affect the way "How" it's designed, managed, and assessed for success.

Theoretically speaking, the project management perspectives (Turner et al., 2010) and the nine perspectives represent an excellent foundation on projects, especially the project

business success, contingency, and the people factor, which this paper focuses and expand from.

When it comes to innovation, creating something new is in a way linked to what projects are intended for, which is to create something unique and different. Both project and innovation are linked to the basic idea of development (Morris, Pinto, & Jonas, 2012). Innovation is becoming a "buzz" word that is being transmitted to organizations and governments around the world whether they are small, medium or large-sized. Fortune 100 companies invest and dedicate billions of dollars from their earning toward research and development (R&D) that is primarily aimed to give them a competitive edge against their market rivals. Apple, Microsoft, Google, and Samsung spend a combined US$32 billion in research and development R&D (CNN Money, 2013). This R&D is being considered an important innovation activity, which often translates into new products, processes or markets (Oslo Manual, 2005). The world's biggest R&D spenders are also responsible for around one third of all the patents filed in the US and EU patent offices. Consequentially, these R&D and innovation investments have a direct impact on the firms and governments overall growth and profitability as per the latest EU industrial innovation performance that uses R&D investment as the key indicator for innovation in at both the private and government sectors (Guevara et al., 2015).

At the industry and sector levels, the deviation and difference between industries with regard to their investment in R&D and innovation are also quite noticeable, giving us an idea that not all industries have the same attention and intensity to innovation. The gap in

investments in firms working in transportation and public service sectors compared with pharmaceutical or information technology services is remarkable.

The lack of R&D investment has certainly impacted the economic profitability and attractiveness of certain sectors and firms within. In a McKinsey Quarterly review analyzing the economic-profit performance of nearly 3,000 global companies from the different industries (Bradley, Dawson, & Smit, 2013). Pharmaceuticals and IT industries that were highly ranked in their share of R&D project investment (Guevara, Soriano, Tuebke, Vezzani, Dosso, Amoroso, S., ... & Gkotsis, 2015), these were also listed among the top 5 industries in terms of economic-profit performance (Bradley et al., 2013), while those who didn't appear to invest in R&D projects are categorized among the bottom five industries, including airlines and railroads in transportation, in economic-profit performance.

Consequently, the principle of "being creative and innovative" has also been integrated within many organizations' corporate's core values, missions and visions' statements, which are used to drive new strategies, plan resources, and even screen new hires as well as assess employees' performances.

Some of the world biggest R&D investors, Volkswagen, has in its mission a specific goal to set the world standards in their respective vehicle class. Samsung's vision for the new decade is to "inspire the world and create the future" with a key focus on "New Technology," "Innovative Products," and "Creative Solutions."

Organizationally, CEOs and senior leaders are busy creating new units to foster innovation within the company to come up with the next “big thing” of product and services that will define their value proposition and competitive advantage within their respective industries. And therefore, we see many Innovation Labs, Think-Tanks, Innovation Awards, R&D centres that are all being created to be led by the highly skilled human resource in order to manage these complex brainstorming and creative-processing activities.

In many cases, and to illustrate how strategically important innovation is for companies, these innovation labs, and R&D units are moved outside the corporate borders as standalone subsidiaries with the goal to break from the traditional (often operational) organizational activities.

The Roche Innovation Center in Copenhagen was set up outside the main company offices in Switzerland, as an independent subsidiary company, focuses on the discovery and development of targeted therapies internationally and offers targeted drug to enter human clinical trials.

The firm attention to R&D and innovation has a direct influence as well as get influenced by the country and government level of focus in this area. No wonder most of the Fortune-500 companies and the leading innovators within their sectors are based in countries with advanced economies that dedicate important portions from their GDP to spend on research and development, with the goal to foster and sustain innovation-based economies with new jobs and employment opportunities according to the new 2016 academic-industry research

by Johnson Cornell University, INSEAD Business School, and the World Intellectual Property Organization (WIPO) — The Global Innovation Index (Dutta, Gurry, & Lanvin, 2016).

Those governments, industries, and firms operating within an innovation supported ecosystem has paid attention to some key enablers like the institution capability, the human capital, infrastructure, knowledge and technology among many other outputs.

It is countries who have the most efficient and effective innovation ecosystem (High GII Score) has a leading economic position (GDP) globally.

In addition to the company and country levels, we can further illustrate the importance of innovation in improving performance at an industry level, the air transport industry (The air carriers) as an example, has one of the lowest R&D investments among all other industries as studied by Mckinsey for IATA in the profitability and the air transport value chain report (Pearce, 2013).

The state of this industry, in particular, that's not enjoying the best economic conditions (ROIC, and economic performance), neither that it invests in the R&D projects, i.e. 67 companies from this industry invested less in R&D projects than 4 IT companies (Guevara et al., 2015)

Many of the critical industry value chain players such as airlines and airports don't even exist in the R&D investment space.

This lack of investment in innovation has certainly impacted the economic profitability and attractiveness of the aviation sector in general, especially for its main players such as the airlines.

In the same token, we could zoom even further to the air transport value chain, and we will find that airlines who invest very little (if any) in R&D have one of the lowest Returns on Invested Capital (ROIC) with about 4.1% by 2011, compared with other aviation industry value chain players such as the technology and reservation system providers and manufacturers, which invest in R&D projects and has higher ROIC than airlines.

With all the above-mentioned about R&D and its link to the country, industry, and company economic performance, and considering the remarkable variation in R&D and innovation investment among the different firms (Apple vs. Air Canada), industries (Pharmaceutical vs. Air Transport) and regions of the world (North America vs. Africa).

This paper is therefore looking through two case studies how some companies in different industry sectors are succeeding and failing to create a compelling sense purpose for their projects to create innovative solutions that impact the socio-economic levels of the internal firm performance and external ecosystem.

To achieve this objective, the paper is broken down into four main chapters following this introduction, we begin by looking at the interaction between projects and innovation with some of their contradictory and complementary challenges and opportunities.

We then study two cases from the aviation and trade sectors to assess how projects are linked to innovation with closer look at the issue of purpose in projects that impact their respective degree of innovativeness.

We then look at some of the key findings from the two cases and conclude with discussing the future outlook in this subject area of purposed projects (Pp.) that create impactful innovation (Ii.).

2. Innovation and project

2.1. Innovation challenges

Organizations' challenge with innovation in today's global environment remains somehow consistent with those discussed by the fathers of innovations such as the case of Schumpeter who argued that the prediction of business cycles and the success of business models rely heavily on the model ability to predict the future with careful consideration of historical events and trends (Schumpeter, 1939).

Similarly, Friedman argued that the solidity and reliability of a model are assessed based on its predictability factor more than its realization (Friedman, 1953).

The dynamic competitive market factors, which that Schumpeter argued foster innovation at a much more efficient rate than a perfect competition is what we are seeing in today's volatile and technologically provoked markets.

The same Schumpeter's creative destruction process (Schumpeter, 1942), which proposed that capitalism survives and strives from the new goods, new means of production, and from the quest for people to evolve in the way we communicate and transport, are the same we notice nowadays.

The Schumpeterian innovation emphasized the point that innovation is not just about technology, as it includes other things such as imagining new combinations of the firm resources and capabilities (Galunic and Rodan, 1996).

And therefore, the challenges we see in our modern days when it comes to innovation are best described in two folds:

The first is related to the definition of innovation (The output), as the word itself can in many cases be interrupted differently by different people, organizations, industries, and governments. In some companies and industries such as in IT and high-technology, innovation is often linked to revolutionary thinking and breakthrough ideas, whilst in other companies and industries such as in the transportation sector, innovation could be as simple as a new product development that in cases were transmitted from another sector or geographical region, which are generally of an evolutionary nature.

Take the example of innovation considered by airlines to track the passengers' luggage using RFID technology, which was previously introduced in other industries such as in the food supply chain and retail industry.

The second fold to the innovation challenge is related to its process and cycle (The input), many companies consider innovation a brainstorming exercise that is done internally (and occasionally with external stakeholders) to come up with an idea to either breakthrough or improve from where they stand today. These ideas often existed somewhere else in the world but aren't evenly distributed, and usually remain at the innovation lab or the R&D centre levels, failing to make it to reality including to markets and the hands of consumers.

This is not to suggest that the only way to foster innovation at the company, industry and country levels is by just spending resources in research and development. There are many examples of organizations that allocated major resources to R&D and yet failed to innovate and create a real breakthrough. However, R&D as we have seen in the several analyses, it remains today as the key indicator for the country, industry and firm level of innovation.

And the famous case of Kodak's in the digital photography industry is one that can vividly be used to illustrate how the company R&D by itself only can't create the innovation that impacts markets and economies. The company that originally invented the digital photography within their sophisticated R&D labs, missed a great market opportunity when they delayed its launch to market for decades, as a result of their lack of agile execution and

fear from losing their status quo leading market position in the traditional film business (Chunka Mui, 2012).

On the other hand, learning from how a company like Sony grabbed an opportunity to take over the global digital photography market share from Kodak. This wasn't because of Kodak's insufficient investment in R&D or lack of innovative thinking since Steve Sasson, Kodak engineer, was actually the inventor of the first digital camera back in 1975. This could be attributed to Kodak strategic failure to try and take the idea from the R&D lab to market in an agile implementation manner.

The above multifold innovation challenge, at both the input and output levels, poses questions on what exactly is considered innovation and what is the process that firms, industries, and countries can use to define and deliver on innovation.

And all with existing innovation definitions and processes being considered, the question this research will attempt to answer is what else we can bring to clarify the concept of innovation and accelerate its processes.

2.2 Project challenges

The Challenge with Projects, on the other hand, can be a bit contradictory to the ones noted in the innovation area. The definition of what is to be considered a project seems to have been widely accepted across all sectors and countries around the world, making it easier to

define and process. However, the challenge with projects today is that many of them are often failing to deliver on what all involved stakeholders would consider as a “successful result”.

Therefore, the challenge in projects seems to be in one hand defining what can be called successful by all stakeholders, which goes beyond the traditional project practises of cost, time and scope outputs, and, on the other hand, the reasons behind the failure of many projects around the world (and the success of the few) despite the clarity in scope, cost and timelines (Economist Intelligence Unit, 2009).

Several studies that analyzed projects’ performance suggested that the majority of projects fail to deliver what their stakeholders want them to achieve, making the project failure a new norm within organizations nowadays. The Standish Group Chaos Report indicated a thirty-one percent as the rate of failure within projects (Oracle, 2011).

2.3 In-between Innovations and Projects

And as we were analyzing the innovation trends, benefits and challenges and those for the projects, we started to detect contradictions, but also similarities and complementarities all at the same time, which led us to believe it is worth exploring the interaction and relationship between the two areas to attempt solving the complexity issue described in the first chapter of this research.

On the complementary traits, what innovation is missing in terms of clarity in definition and process is what projects seem to excel at with some clear and widely consented definition and agreed processes that the innovation area is still searching for.

Looking at the similarities, it seems that today's modern organizations are trying to use both innovation labs, R&D centres as well as the project and program offices to break from the traditional organizational structures with the hope to come up with a final deliverable that is new, unique and different.

On the other hand, no one can ignore the fact that organizations today are still perplexed to put the words innovation and project in the same sentence. Innovation is often perceived within organizations as the free, unstructured and borderless work that requires the genius of the people involved to produce the next big idea, while the project term is commonly perceived as a very structured and defined scope and process that doesn't tolerate deviations and regularly rejects creativity that is considered, "out-of-scope".

Still, the unanswered questions are:

- Why several innovation works don't see the light (market: customers, users or citizens)? And
- Why do several important projects fail? Despite the defined processes and scopes

Looking at it the other way around, what makes innovation work? And what makes the project successful?

Could organizations and governments benefit from the structure of the projects to make great ideas a reality? And can the inspiration behind a great idea define and drive projects' success? It is certainly worth exploring.

Nonetheless, let us first recognize that organizations are generally dense with several internal and external interdependencies, objectives and goals. Within this organizational density, innovation and projects are arguably the most complex work an organization undertakes with the human factor at its highest, connected processes and networked organizational structures. Therefore, exploring a relationship between these two complex undertakings will require applying simplification through an effective use of dynamic systems to try and explain any relationship through the feedback loops and interactions.

We review in the two case studies the success of innovation projects and draw some discussion around this issue.

3. Case Studies

The two armchair studied cases were selected and authored based on several factors; 1) industries where they have been categorized as either low-innovation or law-project intensive industries, and 2) industries where the researchers have spent (and is still spending) time working and observing (Ethnography) 3) semi-structured interviews with key figures in the two organizations

The data was collected through the main researcher field observation and interviews with key experts in the respective sector.

The 1st cast study is in the air transportation sector where innovation is lagging behind other sectors such as IT & pharma while project management is quite developed.

While the 2nd case study organization is in the standardization sector where innovation and intellectual capability are quite advanced and project management is at low maturity level.

Therefore, there are quite complementary and diverse aspects in the two cases. The 1st is technological innovation project while the 2nd is focused on a social innovation project. This is to allow for a wider review and potential application to several players within the studied sectors and beyond.

3.1 First Case Study— The Aviation Industry Innovation Projects Challenge— Industry Vertical Review (Technological Innovation Project)

Air transportation and aviation in particular is a very interesting and dynamic industry as it somehow sits in the intersection between several other industries such as tourism, supply chain, pharmaceuticals, agriculture … etc. While also connects between the micro and macroeconomic activities through the direct impact of goods and business travellers transported by air on the economies, which is a strong economic indicator for the country export and import activities and overall financial health.

The industry and its key players from airlines, airports, to aircraft manufacturers are also volatile to social and geopolitical phenomena. Sanctions are often launched against transporting passengers and goods through air transportation to and from the country in question, and air defence has a big overlap with civil aviation when it comes to regulation and flying rights.

The above reality combined with the fact that the industry is suffering from one of the lowest economic performance compared to other industries, and therefore one of the lowest rates of investment in R&D while being described as a fast-changing and agile industry are the key ingredients for making us study this particular industry.

Observation & Analysis

The National Air Transport Association (NATA) is a trade organization founded in 1980 with a mission to represent and serve the air transport industry with about 50-member airlines, representing the national carriers of the country and 90% of the domestic air traffic. While NATA members are mainly the airline companies, it works with and serves the entire air transport value chain, including the airports, civil aviation authorities (Regulators), air travel and cargo agents (Retailers), as well as the aircraft manufacturers to name some of the key players.

Despite the fact NATA's mission focuses primarily on its airline members, its new vision stresses the importance of working across the aviation industry value chain to create

economic, environmental and social sustainability for all the players including the customer (The flying passengers). It also places innovation as a key strategic enabler for the success of its future work in creating value that drives a safe, secure and profitable air transport industry, which connects economies, people, and cultures from around the country. The organization seven core values include innovation, speed and delivering results which go to highlight the importance of innovation and project delivery within the organization's DNA.

The NATA new organizational structure (Created in 2013) is designed as a matrix to include key divisions to serve the air transport specific segments, supported with main regional offices for Eastern Region, Mid-Region, and West Coast. It coordinates the work between the divisions and regions through a headquarters that also coordinates the crucial work NATA has with the United Nations Agency for Civil Aviation known as ICAO. The organizational headquarters is also where the NATA Director-General is based.

This organization represents an industry, which remained almost unchanged in its core business model since its inception a century ago in 1914 when the first commercial passenger had been flown in the US. Moreover, from that date until recent times, the airline business model remained and operated mostly in the same way with tickets being printed and issued, and passengers purchasing them to be transported from point A to B.

Figure 4: Tony Jannus piloted a Benoist flying boat (1914) with the first commercial passenger Abram Pheil

This economically and socially vital industry that supports 58.1 million jobs with USD 2.4 trillion in economic activities and 3.4% of the national GDP, bridging between cultures, and connects our country with the rest of the world, is overly regulated and controlled activities by the authorities given its impact on national sovereignty. For instance, there is an increase of imposed flying rights and restrictions and a remarkable national carrier's overprotection that blocks natural market access and penetration, as well as expansion in the form of mergers and acquisitions.

With the above in mind, NATA as the trade organization is mainly tasked as well as challenged by its members with the job to continuously innovate new products and services while making sure there are national projects and programs that drive the implementation of industry-wide change and transformation initiatives across the values chain. This is often reflected in the form of the NATA annual industry priorities. As an example, by looking at

NATA's 2015 industry priorities more than 90% of the priorities are in the shape of national projects and programs that aim to drive transformation and innovation.

Therefore, the NATA financial resources and staff are split between new product development with the management of industry products and services and the other side is focused on program and project management to drive national transformation initiatives across the industry value chain.

Although NATA had successfully in the past driven industry-wide national initiatives using the program and project management offices at its central and regional offices, the challenge was and remained to be the lack of original thinking and creativity leading to more innovation for the industry. In today's new organizational structure, there isn't anymore a central PMO unit and instead, several projects and program management offices are embedded within its new structure in the respective divisions.

NATA had always lacked the presence of a think-tank or R&D unit to drive innovation for the industry except for a very premature ideation process that is internally focused, with the employees' individual contribution that lacks validation and collaboration with the external players including the members.

In order to illustrate and expand on the analysis to examine how innovation and projects are crossing one another in the aviation industry and the role NATA plays in the value chain, we can take a closer look at a recent NATA transformational project that drove (and still driving)

innovation across the industry value chain, the NATA Fast-Track (FT) program was the first to launch a decade ago in 2007 with the key mission to transform the passenger and cargo journey experience through the implementation of innovative solutions.

The program which has evolved throughout the past years and currently covers several industry-wide projects such as the Passenger-Journey, Security and Airlines New Distribution Capabilities programs, really started as a direct response to a cost and customer journey integration challenge faced by the industry when a single innovator airline introduced the concept of online ticket (OT) in 1994 in an attempt to reduce their operating cost, reduce environmental impact and more importantly improve the overall passenger experience from the traditional paper ticket that was used since the inception of the commercial airline model 100 years ago in the 1914 when there had seen some few and periodic attempts from airlines to unify and standardize the look and feel of paper tickets as well as its printing and distribution mechanism to gain better efficiency.

To explain how little this core industry solution had been being innovated, here are the key dates and milestones from the commercial flight inception date till the O-ticket first introduction in the 1997:

- Interline manual ticket established: circa 1930
- Transitional automated ticket (TAT) established: 1971
- The standard for Neutral Paper Ticket: 1972

- Launch Neutral Paper Ticket: 1972
- Automated Ticket & Boarding Pass (ATB) established: 1983
- Online Ticket (OT) first introduced: 1994

Whilst OT was first introduced in 1994 and was seen as a competitive advantage for those airlines that pioneered the concept, it still lacked its full potential since adopting airlines were challenged to interline and connect their passengers when flying to destinations with paper ticket carriers. This value chain breakage made the new innovation (OT) a real challenge for the early adopters as they had to maintain (for a relatively long transitional time) two operating systems that supported the new OT while maintaining the paper ticket infrastructure to function in the majority parts of the world where paper ticket was still the only way of flying passengers. This also meant an additional cost and customer inconvenience when using two different airlines, which in a way defeating the original purpose of this innovation.

The above challenge prompted the airlines to mandate NATA to take the necessary actions in order to upgrade the infrastructure and implement this innovation across the industry value chain. Consequently, and in the year 1997, the industry issued the first global standard for online ticketing to help the different value chain players in the different regions to better understand what OT meant and how it could be deployed.

This basic global definition helped clarify the concept and reduced some of the misunderstanding and fear factors among some of the value chain players. For example, the travel agents who felt the OT will mean the elimination of their business model, which was highly dependent on the issuance and storage of the airline's paper tickets. Another example of change resistance came from some security organizations (mostly part of governments) that are located at the different airports and didn't know how a passenger identity would be validated without a physical paper ticket that was used for centuries at the airport security gates.

And even though this NATA-led standardization process with the issuance of the first OT global standard helped in communicating and spreading the understanding of this new innovation, it still faced huge challenges to turn it from a concept in the standard into an actual reality used by all airlines, travel agents and passengers in airports worldwide.

This major cross-industry and global complex infrastructure and technology upgrade project resulted in NATA Board of Governors passing a resolution in 2007 for 100% OT implementation in three years' time from the resolution date. This came almost a decade after this innovation was first introduced in 1994.

The resolution and industry priority resulted in NATA's Director General and CEO back then to form a dedicated Fast-Track (FT) Program Management Office to implement the NATA board mandate on full online-ticketing by the year 2010. The program office was sat up intentionally as a separate unit from the traditional NATA divisions (Especially from the NATA

paper distribution traditional services section) to allow for better focus in delivering the required industry-wide transformational result.

With the defined project timeline, scope and generous budget of about USD 10 million, the PMO work started to roll out in an integrated network format with central and regional program managers that are supported by national project champions in over 120 territories. It also came with a very strong sponsorship from the CEO and close monitoring from the NATA board, which finally resulted with a 100% online ticket (OT) implementation by 2010.

This industry innovation which started as a single initiative by an airline in one region in 1994 became a global reality by 2010. With all passengers flying using online tickets, eliminating the need of paper tickets which resulted in massive cost saving for the airline industry from the printing and distribution of paper tickets that was estimated for up to USD 3 billion per year. In addition to the noticeable CO2 footprint reduction that was not tracked within the scope of the project. It has also simplified and increased interlining activities between airlines in the different regions (That was traditionally a very heavy manual activity), contributing to better market access and revenues thanks majorly to the standard way of implementing OT across the industry.

This innovation which was primarily enabled through the successful projects and program implementation had a collateral impact on the industry as a whole. It did enable other major innovations across the aviation value chain like travel agents who were among the main skeptics of this innovation to reduce their operating cost and liability from the old ticket

printers and warehousing of the paper stocks, allowing them to transform their business from traditional retailers with required physical locations into virtual, technologically intelligent and integrated e-commerce businesses that operate and issue online tickets for passengers from any airline around the world (instead of being restricted to locally airline issued paper tickets).

Airports were also able to better address their major space challenge by deploying common-use-self-service kiosks for an easy passenger check-in experience at airports that allow for faster processing time. Security organizations were able to easily integrate the e-ticket information in advance of passengers' travel, which in turn allowed (in many cases) for faster travel and improved security using advanced profiling and pre-screening techniques.

Airlines themselves have a better market information that is integrated and easy to analyze. And finally, the passengers started to notice the impact of all these innovations when they were finally able to check in from home using the airline's website and mobile check-in services, therefore saving valuable travel and waiting time at airports without having the historical hassle to protect and save the paper ticket in case of loss.

This NATA successful FT-OT innovation project raised the expectation from airlines and the air transport value chain payers (Including the UN agency and governments) for NATA to continue driving innovation and transformational projects across the world. However, with the elimination of a central PMO office in the new NATA structure, and the historical lack of an industry R&D centre (and financial resources), the NATA team and senior leaders are

challenged to keep up with the momentum that has been created and come up with the next big idea that will drive more and bigger innovation in the industry as well as deliver global projects effectively as done in the FT program.

Organization Interventions

With a goal to enhance NATA's ability to innovate effectively (Creating value) for the air transport sector while strengthening the current project delivery capability, several interventions were attempted, including:

1) **Organizational Restructure—Central Development (Innovation), Regional Delivery (Project)** an internal re-organizational change management effort that aimed at breaking down NATA into a development and delivery organization. The centre (headquarters) of the organization was designed to be the lead for innovation and development activities, including new products and services whereas the regions were assigned the delivery of products and services, including running the industry program and projects for their regions. This move was done to mainly strengthen the innovation in NATA while maintaining the strength in the program and project delivery.

2) **New Line of Businesses Thinking (Horizontal Industry Collaboration for Better Innovation):** as an outcome from the reorganization, new line of business (LoB) was created to challenge the NATA traditional vertical and functional line of businesses

that focused on the business model of the product and services offered to the industry (e.g. consulting, business intelligence, publishing, and others) and here it was a sector-based line of businesses (e.g. airport, airline, travel & tourism, cargo … etc.) that is focused on the end client and encourages horizontal innovation in product development. The new sector-focused LoBs were launched as the first horizontal and across functional line of business, with the objective to develop new product and services for the entire market segment. This required a major effort in integrating the product development steps to allow for a cross-industry value creation in all service areas from business intelligence to publishing, training, technology, and events.

This first-time NATA line of business approach is currently attempting to spark one of today's most important cross-industry innovations in the area of the airline and travel agent distribution and revenue management. The aspired new solution for the value chain players (Namely airlines, travel agents, and distribution systems) will collaborate horizontally to facilitate the retailing of the industry products by allowing airline and travel companies to better bundle and unbundle their products and services and create competitive advantage for their respective customers (corporations, leisure and business travellers).

At its core, it tries to address the industry's current distribution limitations by improving the airline's product differentiation and time-to-market, and allow passengers to access to full and rich air content in a transparent shopping experience

3) **Project Management Methodology for Industry-wide projects (PMI-NATA):** In an attempt to support the industry delivers effective and efficient internal and industry-related project and program, NATA created a centre for project management learning and support in partnership with the Project Management Institute (PMI) in the US, the centre had several projects related capability development tools, including training the project managers about the industry, support them to use PMI's project management standards for their aviation-related projects from airline acquisition and expansion to airport infrastructure and technology projects.

4) **Strategy Execution for the Air Transport Industry (NATA-Academia):** Working with the world biggest academic institutions was a key goal for NATA to achieve for the industry in order to benefit from the development of newly validated thoughts in both the innovation and project management and how can both concepts work together. With some academic institutions a study to review the evolution of the aviation industry value chain focusing on the business model innovation for airlines (with the introduction of new low-cost carriers) and travel agencies (with the introduction of e-commerce and web booking engines). It also looked at how project management and strategy execution could help the acceleration of such innovation in the industry through the effective delivery of new product and services to the marketplace.

5) **Strategic Partnership & Innovation Program:** with the belief of the role partnership can play in increasing the effectiveness of innovation, NATA created a partnership

and innovation unit with the goal to increase the number of global partners from across the value chain, including research and education centres to work together in bringing new ideas that translate through project delivery into new products and services for the benefit of the aviation industry and its stakeholders.

3.2 Second Case Study - Government Standard & Quality Organization—A Project Management Challenge–Horizontal Multi-Sector Review (Social Innovation Project)

Observation & Analysis

Government Standard & Quality Organization (known as GSQO) is a federal organization as part of the ministry of trade and industries that work in close collaboration with industry & associations in 65 economic sectors. GSQO is, therefore, the nation's largest developer of high-quality standards which facilitate the exchange of goods and services, support sustainable and equitable economic growth, promote innovation and protect health, safety, and the environment.

Since establishment, GSQO produced around 2,000 standards covering major industries and issues of relevance which assist economic, environmental and social sustainability around the country and the world. This wealth of knowledge is created through GSQO's biggest and most important asset, the GSQO Industry Associations (IAs) in 65 sectors around the country

and the 10,000 experts from all industries and sectors who are organized through technical committees, all working collectively to create standards in every aspect of our life.

Increasingly, the importance and need for standards come from several different and important forces including:

- The noticeable trend in the globalization of trade across countries in various continents.
- The outsourcing and offshoring of procurement and investment by major economies, industries, and companies from around the country.
- The need to address global climate change by adopting various mitigation measures such as promoting energy conservation and efficiency.
- The volatile financial markets and lack of confidence between the different players.
- The public demand for consumer and environmental protection and security.
- The need for international solidarity to face terrorism, epidemics, and natural disasters.
- The global deployment of new technologies and innovation.
- The increase of public services deregulation.
- The succession of economic recessions around the world and globally.

All of these influential factors and others call for an even more role of standards in all and different areas. Here are some examples:

- The GSQO standard related to the twenty and forty-foot containers helped trade and businesses in the country and around the world to use seamless logistics and especially sea freight as a way to export and transport their products from one part of the world to the other, using standardized containers that allows for the supply chain to move seamlessly and safely from the port, to the trucks, to the shops, and finally to the hands of consumers.

- The credit card format and the ability for banks to exchange financial information and for consumers to be able to conduct financial transactions (Including money transfer) using the IBAN code reflect the role of GSQO standards in helping customers and connecting businesses and economies in the country and around the world.

- In technology, the specification of the camera on the smartphone, the JPG and MPG files for photo and video helps people in the country and around the world to connect sharing important moments in their lives with friends and family anywhere and time.

- In the medical sector, laboratories around the world use GSQO standards in sharing similar testing codes and protocols which improve the efficiency and safety in laboratories, contributing to the advancement of major medical discoveries.

The lack of standards can equally cause major inefficiencies, customer inconvenience, and potential harm to consumer safety and to the environment. The consequence of non-standardization can be seen in our daily lives when for example travellers between countries have to use different electrical power plugs to charge and use their different electric machines and appliances, which is not just an inefficient process that is costing

manufacturers and consumers major investment, it is also an inconvenience and unsafe practice for consumers.

Figure 5: Effect of non-standardization on consumers and producers

For this reason, in particular, GSQO and its IAs sat for themselves a key strategic objective to be always the leading, open and connected community in developing standards that are accessible, used and trusted by all potential stakeholders.

The GSQO system has one central secretariat (CS) with a flat and thin structure that is majorly tasked by its IAs in facilitating the development, production, and delivery of the different GSQO standards. These standards are being created by the industry experts who work in GSQO Technical Committees (TCs) around the country and across the different sectors. The TCs are being managed through the GSQO IA in the respective sector.

GSQO enjoys an incredible amount of intellectual capital and innovation capacities that are being driven through the collective genius of the industry experts who meet and discuss latest trends and topics. The ultimate objective is either to spread a single innovation across the country and the world or to solve a global challenge to protect consumers and improve efficiency. Thus, the challenges in the GSQO work are two folds:

1) Its ability to accelerate the process of the development and delivery of those standards in the different industries while maintaining its current quality that gave the GSQO name its trusted brand, being recognized for quality and consensus. GSQO Technical Committees (TCs) that are voluntarily run, driven by the stakeholders' motivation to advance their area of work, could take several years (2 years on average) to produce an industry specific or cross-sector standard. On one hand, one should recognize the complexity of the different stakeholders' interest (e.g. the same GSQO TC can have global competitors working together to agree on a global standard for their respective industry). On the other hand, the production of the final GSQO standard with all the required consensus can have the risk of being irrelevant or absolute at the time of production as compared to when it was originally envisioned (i.e. the risk of a continuous scope creep).

2) The GSQO second challenge at IA level once the GSQO standard is introduced by the technical committee, which in many sectors (especially new sectors) around the country can represent a massive innovation and transformation to their local status quo. Therefore, the IA has a real challenge to work with the local industry stakeholders from companies and

consumers to ensure they understand and implement the new GSQO standard to start realizing the impact it was envisioned for it when first initiated.

And to illustrate and expand on the analysis to examine how innovation and projects are intersecting in the standard development sector and the role GSQO plays across the multiple industries and sectors, we can take an example of the development of GSQO Energy Management Standard.

The reason behind creating this standard started when a leading food manufacturing company noticed an increased operating cost coming from its energy consumption at its various facilities around the country. The electricity and gas consumption were the costliest, consequently, the firm margin started to suffer from this uncontrollable expense.

This has forced the company to rethink its processes and the way staff consumes energy, as well as the way and structure of each facility, was set up.

The new redesign processes resulted with an innovative management system that allowed the company to effectively set energy targets for each of the facilities, monitor relevant key performance indicators in areas like electricity, gas and water consumption, and finally implement structural, procedural, and human behavioral changes to achieve the new energy objectives over the time.

The above happened at the same time the Manufacturing Industry Association, which represented all food, car, and other production firms, was pressured by environmental groups, doctors & scientist, media and citizens to come up with new ways to control climate changes and global warming, especially in the rise of several new manufacturing facilities in the region. The industry association was made aware on the initiative of the new energy management system the local food manufacturing company started to implement to control its cost and realized this can also potentially be the solution to the environment and climate change issue.

The association met with the food manufacturer that came up with the new energy management system, and other members from different manufacturing firms, and explored with them away for the model the food firm developed to be shared with the other manufacturing firms in order to widen the financial and environmental benefits across the industry.

The food manufacturing firm accepted the proposal as they saw it as a unique way to enhance their brand across the industry as the leading firm in the practice of energy management. Consequently, the firm submitted together with their association a proposal to GSQO for a new standard in Energy Management System.

GSQO then shared the proposal with wider pool of experts in the manufacturing and other industries such as transportation and IT from all the regions and asked to validate if the proposal is worth becoming a standard i.e. the applicability within manufacturing and

beyond, as well as the benefits from and feasibility of implementing the standard within their organization. GSQO did also share the proposal with the regulators from the government, as well as with some special groups that are concerned with the area such as environmental and consumer protection groups.

The feedback received by GSQO was positive from all the stakeholder groups, with few modifications to be added to the energy management system the food manufacturer had originally designed to ensure applicability to all the concerned players. One modification that the regulator and special groups asked for was to add a measurement and improvement indicators related to the CO2 emission and footprint, in addition to the cost and energy saving indicators that were initially in the proposal.

With this wide consensus, GSQO next step is to help in the creation of a technical committee (TC) with experts in the field of energy who represent all the stakeholder groups. The TC mandate is to ensure that the proposal is further developed into a detailed business plan with the project plan, financials and time to take the concept into a final standard that GSQO can begin to produce and set the certification and quality control based on its model, and governments can also use it as a regulatory framework for complying with a new environment measure.

In order to achieve the above end result, the first step is to decide on the formation and roles within the TC. Therefore, it was proposed that the food manufacturing firm that introduced the original concept acts as the chair of the TC considering their prior experience in the area.

GSQO appointed the manufacturing industry association as the secretary for the TC with the task to coordinate the work between the members of the TC and with GSQO.

An open invitation was sent to all the stakeholder groups i.e. all manufacturing firms, other interested industries like transportation, consumer and environmental special interest groups, government, scientists … etc. to voluntarily participate in the TC work to produce the new energy management standard.

GSQO appointed resources from within its central secretariat to support the TC chair and secretary through the editorial, publication, and online collaborative services to facilitate the TC work and communication.

The TC met each quarter to review the progress made, the chair was appointing tasks to the member of the TC (or they volunteered to it), one example is defining the energy term, another is proposing the measurable performance indicators, creating new templates … etc.

The work which was voluntary and required the contribution from all involved members took close from 40 months to produce a draft standard.

GSQO took the draft and cast it for all its members to formally vote on it to be finalized as a GSQO standard, the consensus was crucial criteria of the standard development work.

After few modifications, the votes from all members came positive and GSQO central secretariat published the energy management standard, which was then set as the charter for conformity and certification of companies that wanted to comply with the standard, and government referred to the standard as a basis of their new environmental regulatory framework.

Once the standard production was completed, many companies from all the regions wanted to know how to use it and apply the system to their respective context in order to start benefiting from its attained financial and energy savings, as well as to comply with the government new CO2 emission scheme.

GSQO could not ask the same TC who helped writing the standard nor the founding food manufacturing firm to take on the task of developing the capability of all its members and their companies, and therefore took the capacity-building role on its shoulder to avoid risking the standard from becoming absolute and irrelevant (Another publication on the shelf) and to maximize the socioeconomic benefit from the standard and raise the awareness of the value and impact of standardization in business and life in general.

Figure 6:

Organization Intervention

With a goal to enhance GSQO's ability to utilize project management effectively (Accelerate the development of standards and their implementation) for all sectors while strengthening and capitalizing on its current ability to collect the intellectual capital and innovations from industries around the regions, several interventions were made including:

1) **Strengthening the Central Support—**GSQO Central Secretary started to realize the importance of creating a certain level of discipline in the different global TCs and created an important role within the organization called "Technical Program and

Group Managers" (TPMs and TGMs). Its primary job would be to coordinate the project work of the different TCs within a specific sector (TPM) or group of sectors (TGM). While the TPM role is very helpful, the challenge remains at the TC level organized by the respective IA (i.e. the role of Secretary and Chair of the TC).

The GSQO Directives mention project management in the context of the project leadership (TC leaders) being responsible for managing the project of developing the standard according to the project schedule. One of the primary objectives of project management, according to the Directives, is the development and approval of the standard on schedule.

- The TC Secretariat is responsible for project management, which includes developing the schedule, defining the project team, and managing the schedule
- To facilitate the monitoring of project development, GSQO has adopted a systematic approach to project management, based on the subdivision of projects into stages and sub stages. —Project management is defined as the stages used for tracking the progress of the activity.
- The secretariat of the technical committee or subcommittee is responsible for the management of all projects in the program of work of that technical committee or subcommittee, including monitoring of their progress against the agreed target dates.

- The directives do not define project management or give guidance on how to manage a project.

2) **Organizational Restructure—Project Management Office for Capacity Building, Research and Education (GSQO Academy)**: GSQO central secretariat announced the launch of a new department to look after projects that are aimed to assist its members in strengthening their capabilities in two areas; the standard development processes (i.e. including the use of project management as a tool for the GSQO technical committees work), as well as the understanding and implementation of the different GSQO standards within the industry members and their respective companies (e.g. ISO standards in energy, water, social responsibility and others).

3) **Project Management Learning & Research**: Two major interventions were made to enhance the organizational effectiveness to accelerate the collection and development of the intellectual capital gathered from the different GSQO technical committees. The first is related to the development of project-related competencies for the Secretaries and Chairs of the GSQO technical committees. The series of blended learning and development activities were launched reaching all regions and industry sectors with the main objective to develop the project management skills in the GSQO technical committee and therefore decrease the cycle of standard

development. Using the GSQO own standard in project management as the guidelines for these development activities. The second intervention was in the research area, with convincing the governance of GSQO at the Technical Board to launch a research project with the key GSQO technical committees to underpin the reasons for either their success or failures. Therefore, creating practical case studies and guidelines for new or existing technical committees on how best to use project management techniques that improve their development cycle.

4) **GSQO Standard Development & Innovation**: In the quest to highlight the socio-economic impact of the standard development and implementation to innovation, a strategic partnership and conference were made between GSQO and some renowned global research centres. The conference was conducted with experience from IT, aviation, medical and infrastructure sectors that clearly highlighted the benefit and impact of standards in creating and disseminating technologies, opening new markets, supporting the business strategy of innovative companies, defining and implementing successful innovation policies.

- Contributing to technical evolution by applying, at the right time, critical design constraints (i.e. avoiding reinventing the wheel). They can help to reduce wasteful, redundant product development—thus freeing up resources that can instead be dedicated to fresh, inventive work.

- Facilitating the development of new markets and trade by helping to establish and exploit network effects, increasing consumer confidence and allowing to reach critical mass
- Permitting the sharing of investments and risks associated with the development of new technologies and applications (innovation through collaboration).
- Helping the commercial exploitation of innovative ideas, providing a basis for dissemination of information and an accepted framework within which patents can be drawn up, removing undue proprietary interests and barriers to trade.

4. Key Findings

The semi-structured interviews and ethnographic observations of the two case studies revealed that, in the first case:

The organization seemed to be delivery-driven with many projects and programs that are being deployed for the various aviation value chain stakeholders around the world. This could be partly attributed to the nature of the industry that is fast-changing and margin-thin when it comes to profitability. Therefore innovation and creativity placed in a secondary raw compared to project delivery unless innovation is driven from forced external industry change.

It was very seldom to observe the organizations linking innovation represented by creating new solutions to the discipline of project implementation and delivery. Few small departments that are succeeding in the development of new and relevant industry solutions are linking the development to the delivery without even noticing i.e. creating any formal processes to increase and accelerate the best practice.

The interviews confirmed that many of the great ideas lose its way due to the lack of the experimenting and implementation discipline.

There is a vivid lack of creative ideas i.e. leading to new and relevant industry products, services or solutions, either due to the lack of active engagement with their users or for the fact even good ideas don't get to be implemented. Therefore, many of the ideas it creates today are self-generated and often faces huge resistance within the industry value chain.

The projects implementation success rate has dropped (Industry Priority Scorecard) mainly due to lack of engagement of the program teams of the value and impact of the solutions they are deploying for the industry stakeholders.

Externally, members and industry stakeholders are showing greater sign of dissatisfaction of the organization work, and relevance to their work (Members engagement & customer satisfaction surveys).

There were few examples highlighted in the interviews of successful industry-wide innovative solutions when the owner decided to work on the idea creation with the users and implemented the solution in a pilot approach.

One region appreciated the concept of linking the idea creation to project implementation to the extent that they assigned the idea generator to lead the project as sponsors to ensure its success for the industry. Nonetheless, this is causing a major resource constraint for the idea generator causing a demotivation to create new concepts.

Interviews from the industry saw a need to bring idea generation, especially with users, to become an integral part of the solution delivery in order to overcome some of the issues facing the organization to be positioned as innovative by creating more and relevant value to its global stakeholders.

Whilst in the second case:

Many experts and technical committees are forming to create new concepts for national, regional or international standards therefore the organization and sector are innovation—driven with many ideas and concepts that are floating from experts in several industries and sectors in the quest to come up with a standard way of working and doing things. This sector is mostly voluntary and experts are often self-funded from either their employers, industries, or countries hence has no major pressure when it comes to financial or time management.

The observation is that the organization and sector always placed the creative part i.e. creating new standards away and separate from the project delivery i.e. publishing and materialization of the standard.

The organization works with hundreds of new concepts for potential standardization. However, many are lacking behind with more than three years of discussion within the technical committee members (Standard development stages dashboard).

The technical committee has a chair who is often a leading expert in the subject matter and a secretary that assists in the compilation of the feedback. It clearly lacks any principle of project time and scope planning as it's often left to the discretion and good judgment of the technical committee members. This results with problems at the industry and country levels due to the lack of standardization, which in turn influence the creation of substitute standards that are of less quality and consensus. Even when the standard is delivered after three or four years, it sometimes loses its relevance due to the fast-changing technical aspects, or in a non-ending expansion of the standard scope resulting in further delays and scope creeps.

There are few successful agile technical committees who delivered on new standards on time with high quality and consensus from their respective value chain stakeholders. The chairs and secretary of those technical committees were often very charismatic, align and had a very good sense of planning without necessarily linking what they naturally did to the project management principles.

The creation of new international standards related to project management e.g. PMI PMBoK, ISO and others, which were formed by technical experts who also possess good project management expertise has helped raise the awareness of the possibility to link the two areas i.e. creation with the delivery.

Interviewees from the sector are seeing the need to be developed & trained in general management areas aside from their established technical expertise to assist them in better planning and delivering their ideas to their industry stakeholders.

1. Discussion and conclusions

The two case studies and filed interviews reveal a consistent trend that projects which were designed with a great, clear and meaningful purpose to solving a problem, or create new solution (Jones & Gutiérrez, 2007) are most likely to generate new and unique value of innovation that has a visible short, med and long-term impact on the social and economic activities.

This could be modelled in an equation for organizations that aims to increase its innovation culture and management to stimulate new projects that are very well conceptualized based on a meaningful purpose.

Projects purpose (Pp.) = Innovation impact (Ii.)

This model can also help organizations define innovation and its processes and cycle based on the modified version of the existing project processes (Albaidhani & Romero, 2018).

Reversely speaking, for those organizations that are struggling to make their projects work successful i.e. delivering on the stakeholder's expectations, they could benefit from using the innovation impact evaluation short, med and long-term contribution to the social and economic levels.

Innovation impact (Ii.) = Projects purpose (Pp.)

Practically speaking, the finding of this paper can contribute to helping organizations increase their innovativeness by simply create the missing link with its projects activities. This comes through strengthening the sense of purpose in projects and programs with an initial eye on innovation with impact.

It also helps address an ongoing challenge within organizations to evaluate the impact and success from its various projects and programs, which the paper argues can be fixed by assessing projects' success to their "Why" they have been purposed and look at the final project impact instead of the traditional "How" they have been managed (Time, scope and cost).

CONCLUSION

This research began with a simple query to find a practical answer to the organization constant quest for creating a new value while being able to deliver core results to its various stakeholders.

In the first chapter, a research context was established by breaking down this complex query and its polarized organizational demands into two folds, one that focused on the innovation dilemma within organizations, with an attempt to review the relationship innovation performance has at the firm, industry, and country levels. It was apparent that the innovation within firms has two key challenges, one related to its core definition by understanding the real meaning of an innovative output, and the second is related to the process of how innovation can be realized within organizations.

The second fold of the research focused on the project delivery at the various levels, this revealed a different sort of challenge compared to the ones described for innovation, in project definition and processes were relatively clear. However, the definition of what is considered a success in projects had wide variation based on the context and stakeholders' views. This issue, besides many possible other reasons, has

resulted with a major amount of projects considered failures in the various industry sectors around the world.

In this first chapter, this research viewed both folds; innovation and project, in the same lens, by looking into how the two areas' identified gaps and challenges could potentially be complemented through their respective strengths. It was recognized that this area of research to study the relationship between innovation and project cycles to answer the organizational challenge to continuously create new value while delivering on its core mandate is a relatively new at both the firm and academic fields. Hence came the need to review the academic and professional literature related to the main variables of this research, innovation, project, and their interaction for impact and value creation, all under the bigger umbrella of the evolution of management from its traditional view into the modern-day application.

In the second chapter, the framework and research methods were established to unveil possible conceptual and practical findings to address the research question. The starting point was to conceptually define innovation and project, and look at the theoretical framework that could link between the two. Pro-Innova (Short for Project—Innovation) theoretical framework was proposed as a way to help integrate between the various projects and innovation activities. Pro-Innova came with two variables to be studied, an independent variable related to innovation, named ideation, and a dependent variable related to project, named implementation. The model hypothesis

was centred around the change triggered in the dependent variable, project implementation, from the independent variable, innovation ideation.

Due to the relative complex nature of the research variables, it was necessary to deploy a mix of qualitative and quantitative research methods, including the use of multiple case studies, semi-structured interviews, field observations and surveys. The rigour of the blended research tools yielded with scientific publication in reputable and specialized international journals and conferences. The revealed some interesting insights at both the theory and practical levels, which were discussed in detail in the three articles.

In the third chapter, the first article “When Project Meets Innovation: PRO-INNOVA Conceptual Model” (Albaidhani & Romero, 2018) was published in the January-April 2018 edition of the Journal of Modern Project Management. It was written with the primary objective to review existing literature combined with the researcher ethnographical work to add a new perspective into how project management is transforming from traditional operational use into a value creation tool. This article has since been reviewed and cited by other researchers in other international scientific journals, most notably, in the Academic Design Management Conference, and its published article “Narrative Reframing on Complex Projects” by Bowman & Crawford (2018) from Gedeth Network in Spain and The University of Sydney who pointed to the article transformative view on project management from being traditionally viewed as operative into becoming creative in nature.

In the fourth chapter, the second article "ProdJecting the Future: New Product-Project Development–The Prod-Ject Management System" (Albaidhani, Meddeb & Romero, 2018) was published in the September-December 2018 edition of the Journal of Modern Project Management. It was written as a build-up from the first conceptual article to present the empirical results of this research, namely the result from the international survey and the semi-structured interviews, which revealed some of its key findings including the description of the new project-product management system with its practical processes, systems and organizational structure. It attempted to answer the question of how organizations can pragmatically use a new project-product management system (Prod-Ject MS) that will enable them to create and operate at the same time.

In the fifth chapter, "Projects with Purpose (Pp.) = Innovation with Impact (Ii.), Examining Technological and Social Projects" was accepted in the June 2019 edition of the International Journal of Arts and Sciences' (IJAS) Conference hosted by McGill University, the article is presented in such a way to allow for the Prod-Ject Management System to be tested for viability through two hypothetical case studies. One case is focused on the technological innovation projects while the second is examining the social innovation type of projects.

This research stared with simple query to address some of today's modern organization challenges in creating new value while delivering result. To improve our understanding of innovation and project management. On one hand, project fail rate

could be largely attributed to the state of mind of many organizations that approach new projects trying to predict all its details (scope, time, cost and stakeholders) from the conception stage, not sighting several unknown variables in an increased organizational complexity (Matta & Ashkenas, 2003). And on the other hand, innovation failure could be reasoned to organizations vague approach that tend to focus only on the creative part with neglecting taking it to the realization stage.

It was evident in the literature review that limited research was done to study the relation between project and innovation within organizations, the three most notable was by Hobbs, Aubry, & Thuillier, 2008; Martinsuo, Hensman, Arto, & Kujalo, 2006; Thomas, Williams, Cicmil, & Mullaly; 2010. However, they have not specified a model for how modern organizations could practically apply a new management system that will allow them to create new value while still delivering with agility.

A New Way of Conceptual Thinking:

The sum of the findings of this research and its three articles suggest a pattern in how traditional project management is in need of serious rethinking. It also offered some alternative design-thinking for how project management can still maintain some of its key traditional operational features while evolve into a creative tool that helps organizations innovate new value.

The Pro-Innova & ProdJect frames provide flexibility and structure to navigate fluidly through organizational complexity. Especially in exploratory innovation journeys when little information is known to the project. The new theory presented in this research is emerging to challenge traditional project processes and organization as well as the definition of innovation management system by attempting to design—think the innovation and the project systems, phases and activities (Albaidhani, Romero, 2018). The new research argued and proposed a new theoretical model (Pro-Innova), using some aspects of the system dynamics loops to move away from the waterfall sequential process blocks that could limit our ability to imagine and paint a new framework of project collaboration through the use of process ontology (Chia, 1997; Rescher, 2012). The focus of the proposed theory was to analyze the complementary and shared traits found in both areas (Innovation and Project) to address the challenges, limitations, contradictions as well as the complexity each area has on its own.

This research identified a unique area within projects that were rarely discussed in research that is when organizations are managing vague, ambitious, and outside the box exploration missions with little clarity on the scope, timeline and resources. As shown in Figure 6 of our first article (Pro-Innova unique position), our proposed Pro-Innova framework is best used when the degree of originality in the innovation ideation (y) is very high, while the discipline and agility for project implementation are also high (z). The formula Pro-Innova proposed is simplified in that the increased

frequency of new ideas created multiplied by the agile ability for the organization to deliver them will result in a greater new value that has impact:

Increased Idea creation (y) X Agile Project delivery (z)

=

Greater Pro-Innova impact (Δ yz)

Instead of following a streamlined set of processes as proposed in traditional project management, which aim at reducing variation and failure, the Pro-Innova and its ProdJect model creates fluid yet framed environment that allows for increased variation, failures and therefore an eventual high impact and overall success.

The research and proposed theoretical model Pro-Innova is also creating a full cycle from purpose-to-impact in order to help analyze the interrelation between innovation and project as a framework that could potentially aid innovators in their struggle to materialize their ideation cycle while assist project leaders to make sense of their delivery work. The model attempts to assist the organization at the macro level to balance the forces from the two polar disciplines within the organization, and potentially at the industry and country levels. The empirical research revealed that the Pro-Innova model main two variables (Idea creation & Project implementation) are actually linked and could be considered for integration.

The model attempted to break down the demanding and complex organizational need to create and deliver at the same time, by brining between the two areas of idea creation and project implementation with a special look at 3Cs:

1. Creation of new concepts and ideas

2. Coordination within the organization to deliver in an effective and efficient manner &

3. Communication and engage with all the internal and external industry or global stakeholders for a higher impact with success

Practical Application:

An original and more practical management system ProdJect was unleashed in this research work that detailed how Pro-Innova could be operated with detailed processes, systems, roles and organizational design. The ProdJect management system offered a detailed and comprehensive purpose-to-impact cycle, offering a new and unique way to approach, launch, execute and evaluate the ProdJect type of projects where project and new products are being co-designed and created. It focuses on spending more time on detailing the project purpose and intentions to help increase success rate that goes beyond the limited focus on traditional project performance indicators such as time, cost and scope.

Pro-Innova and ProdJect findings could also be considered as a process innovation that is aimed to help with product innovation to maximize its impact (Lee & Schmidt, 2017) for ideas to live during their product lifecycle with effectiveness, relevance, and overall sustainability. The success of innovation projects are less weighted on their ability to deliver on time, scope and budget as it is being viewed traditionally. More weight is given to their ability to create a strong purpose-to-impact cycle, and not start-to-end points.

The two case studies and filed interviews reveal a consistent trend that projects which were designed with a great, clear and meaningful purpose to solving a problem, or create new solution (Jones & Gutiérrez, 2007) are most likely to generate new and unique value of innovation that has a visible short, medium and long-term impact on the social and economic levels. This could be formulated in an equation for organizations that aims to increase its innovation culture and management ability to stimulate new projects that are very well conceptualized based on a meaningful purpose.

Projects purpose (Pp.) = Innovation impact (Ii.)

This model can also help organizations define innovation and its process cycle based on the modified version of the existing project processes (Albaidhani & Romero, 2018). Reversely speaking, for those organizations that are struggling to make their projects work successful i.e. delivering on the stakeholders' expectations, could benefit

from using the innovation impact evaluation at the short, medium and long-term contribution as part of the suggested integrated handover between project to product lifecycles.

Field Implication:

The impact of this research finding at the theoretical and practical levels with the two proposed modes (Pro-Innova model and ProdJect Management System) could suggest that the struggle described in the two hypothetical case studies based on the ethnographical observation be partially solved.

In the first case study in the aviation sector with high intensity of technology projects, the lack of innovative value creation could be enhanced by spending more time on understanding the purpose numerous projects and programs that are run across the industry value chain. By strengthening the intention of existing or newly launched projects, it would contribute to increasing innovation and success rate.

The second case study in the quality and standard development sector with a cross industry socio-economic collaboration and value creation, the weakness in delivery could be enhanced through the integration of the project implementation cycle within its existing expert-led idea creation space. By doing the integration, agility through delivery will increase the chances for valuable ideas to be realized in the respective industries.

At the current time, the model and management system discussed in this research is being proposed to manage new or renewed complex programs within the government and political structure. The finding from its full implementation would be reviewed to further enhance the model configuration, and its processes, systems, and roles.

Limitation & Future Tracks

It is also important to note that Pro-Innova model and its ProdJect management system will need to be further studied when it comes to its third variable (Impact) as the success criteria. The survey research finding showed that customer/user satisfaction has heavier weight than the long-term impact that the model originally proposed. The current field implication with the model being tested by the researcher will reveal more insights on its impact.

Another modification to the proposed model would potentially be needed in the way of implementing newly revolutionary type of ideas. Some of this research findings suggested a more modular, phase-based approach with using pilot experimentation and select group of users are more appropriate than going into a fully fledged project delivery model which could be resource-risky if the implementation reveals some gaps in the original idea.

It was also observed from the interviews and case observations that the Pro-Innova conceptual framework and its ProdJect management system while proven to be generally accepted across sectors and regions as a framework for exploration type of projects that are intended to create unique outcomes that impact for the long term, it nonetheless shouldn't be seen as a "one-size fits all" principle. A careful modification by interpreting the model to how it could best fit the industry or country it will be used for. One example we noticed while interviewees and survey participants agreed on the link between the two areas, they sometimes interpreted the link differently..

Another modification could be considered when analyzing the purpose and impact of the project i.e. the Pro-Innova & ProdJect model should spend less time in the first conceptualizing and analysis phases when the intend is clear and the focus is more of a production nature than when the intent is less clear and the focus is more of an exploration nature.

Finally, we should not underestimate the power of human interest and the complexity it drives during the development work, which has been voiced during the interviews and field observations. And while an organization, industry, or country could be doing everything right as per our proposed Pro-Innova and Prodject model, they may very well still fail for several reasons including the invisible political environments, struggle of power and conflict of interest all linked to the basic human needs to survive and grow, which were not discussed in detail in this research work.

The current field implication with the model being tested by the researcher will reveal more insights on its impact. It could result with a future research plan to review all mentioned aspects of the proposed model and management system with users, and evaluate its success and impact. This will also allow for the definition of the core competencies and needed resources for managers to successfully apply and use the new ProdJect management system compared to their traditional and separated project management or innovation respective tasks. This will help mitigate straining existing resources by doing more than the one task they used to perform e.g. project managers becoming Pro-Innova leaders with innovation and project responsibilities and vice versa for R&D Innovation Managers.

Annexes:

Annex 1: Publications

1. The first article (When Project Meets Innovation: Pro-Innova Conceptual Model) was accepted and published in the Jan-April 2018 edition of the Journal of Modern Project Management (Below is the published article with the link to the website)

PhD aticle1—Copy.pdf

http://www.journalmodernpm.com/index.php/jmpm/article/view/308

2. The second article (ProdJecting the Future: New Prod-Ject management System) was accepted and published in the Sept-Dec 2018 edition of the Journal of Modern Project Management (Below is the published article with the link to the website)

JMPM01708.pdf

http://www.journalmodernpm.com/index.php/jmpm/article/view/359

3. The third article (Project with purpose [Pp.] = Innovation that impact [Ii.]) was accepted and presented for publication at the June 2019 International Journal of Arts and Science, which is hosted by McGill University (Below is the acceptance letter and link to the conference website)

3rd article.pdf

https://ijas2018canada.sched.com/

4. Final research defense presentation on October 9, 2019. A storyline summary of how the research begin and concluded, answering the committee questions at the theory, practical and application levels. The presentation resulted with the acceptance of awarding the doctorate degree with excellence as the overall rating

https://www.uqac.ca/evenement/1048-soutenance-de-these-dismail-albaidhani-etudiant-au-doctorat-en-management-de-projets/

5. At the practical front, a fourth article (Technology innovation projects and standards in the aviation sector) was accepted for presentation and publication at the CERN 2014 International Conference on Standardization & Innovation (Below is the published presentation and link to the conference website)

CERN.pdf

http://cds.cern.ch/record/1969881

And below is the letter from Harvard confirming the 2015 interview “Put good ideas to action” with a link to its video

HBR letter.pdf

http://www.kaltura.com/index.php/extwidget/preview/partner_id/506471/uiconf_id/24670302/entry_id/1_oe31erhi/embed/legacy

Annex 2: Researcher & Co-Authors Contribution

Here are the forms signed by the co-authors that explain the majority contribution of the researcher in the writing and analysis of the main academic articles

Accord_coauteurs_Al baidhani_Ismail (1). pd

Accord_coauteurs_Al baidhani_Ismail_2 [1].

Annex 3: Ethic Commitee Approval

Annex 4: Researcher Biography

ISMAIL ALBAIDHANI is an international capacity building project expert with a prime focus on enhancing the human & organization performance. He works with the Government of Canada and served as part of the United Nations Agency for Migration in Capacity Building Projects, and with educational institutions like Stanford University in the US, Nanyang Technological University in Singapore, and the University of Geneva in Switzerland.

He held senior global roles at international organizations such as the IATA in the aviation industry, ISO in the trade & quality sector, UNICEF in the humanitarian sector.

He is currently part of the ISO technical committee to draft and finalize the new international standard in innovation management. And served as part of the Project Management Institute global advisory board.

Ismail's doctorate and research specialization is in the management of projects with a focus on innovation management from the University du Quebec a Chicoutimi

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