ANEXO # 4

BRIEF OF "MANAGING INNOVATION" FROM TIDD & BESSANT

En este anexo se consolida la información más relevante del libro MANAGING INNOVATION, escrito por Joe Tidd & John Bessant. Este libro es considerado uno de los más relevantes y actuales en materia de Innovación corporativa y es la guía teórica que soporta la realización de este proyecto de maestría.

Lo que se resumen en este anexo es una síntesis de la información leída en el texto.

As this chapter is based on the book **Managing Innovation**, and all the texts must be considered citations of the book. (Tidd & Bessant, 2013).

After reading the book, some chapters are considered a key element for this project. As part of the methodology, theses chapters were analyzed and summarized in the following figures in order to have a guideline of the important information highlighted from the text. This means that this part of the theory is key to be considered at the final proposal (next chapter) as it covers some of the opportunities previously identified.

This chapter as well is valuable for the leaders and teams in general at O-I in order to understand the importance of Innovation and guide them on the implementation phase of the model. It can be used on the training program of the Model.

1. What it is Innovation and why it matters?

In the current competitive world and context, innovation becomes in one of the most important keys of successful for the organizations and companies, because it offers a competitive advantage specially for those organizations which can mobilize knowledge and technological skills and experience to create novelty in their offerings. O-I is certainly one of those organizations.

As an example mentioned of the book: *"According to the NASDAQ, Dow Jones and FTSE markets and in 2009, when other companies share prices grew on average by between 40% and 70%, this Innovation Leaders' average growth was 130%".* An Australian government website also says that *"Companies that do not invest in innovation put their future at risk: Their business is unlikely to prosper, and they are unlikely to be able to compete if they do not seek innovative solutions to emerging problems". So, "whatever the dominant technological, social or market conditions, the key to creating and sustaining a competitive advantage is likely to lie with those organizations with continually innovate".*

On the book, **Innovation definition says** that: "Is more than a simply idea; is the process of growing them into practical use.", "(...)making them work technically and commercially". Freeman (1982) defined that Industrial Innovation includes the technical, design, manufacturing, management and commercial activities involved in the marketing of a new (or improved) product of the first commercial use or a new (or improved) process or equipment. Rothwell and Gardiner (1985), says that Innovation does not necessarily imply the commercialization of only a major advance in the technological state

of art (a radical innovation) but it includes also the utilization of even small scale changes in technological know-how (an improvement or incremental innovation). Porter (1990) says that companies achieve competitive advantage through acts of innovation. The approach innovation in its broadest sense, including both new technologies and new ways of doing things. And finally, Branson (1998) conclude that an innovative business is one which lives and breathes outside the box. It is not just good ideas, it is a combination of good ideas, motivated staff and instinctive understanding of what your customer wants.

If those definitions were proposed around the 1990's, imagine the meaning that have today, where the competitive environment is as aggressive as many companies that born every day don't make a success path surviving and even more challenging: delivering high value to differentiate themselves from the competitors. Other big monsters that were successful companies for years, disappeared just for a lack of Innovation vision on their leadership, such as Kodak or Blockbuster to mention some examples.

The model of innovation has four key phases. 1) It starts searching and bringing new ideas to the system. 2) Then select from that set of options the variants most likely to help to grow and develop: which choices give the best chance of standing out from the crowd? 3) Next phase is implementation, converting ideas into reality. **Capturing Value**, Is it successful? If it is a new product/service the market will rush to our stall to buy what we are offering, or if it is a new process, our internal market will buy into the new way of doing things and we will become more effective as a result.

The innovation space also has four dimensions: you can innovate in product, process, position or paradigm. They are called the 4P's of Innovation. When you innovate in product there are changes in things (product/services) which and organization offers. Process innovation is about changes in the ways in which they are created and delivered. Position innovation are changes in the context in which the product/services are introduced, and by last, paradigm innovation, are changes in the underlying mental models which frame what the organization does.

But, when we are innovating, we should consider some of the other characteristics:

The degree of novelty: is it an incremental or a radical innovation? "Studies of incremental process development suggest that the cumulative gains in efficiency are often much greater over time than those which come from occasional radical changes."

Platforms of Innovation: this is a way of creating stretch and space around an innovation to establish a strong platform or family which can be extended. Is the ability to enhance and improve performance over many years from the original design concepts: "where the basic concept can be adapted and tailored for a wide range of similar applications without undergoing the high initial design cost". This is for example what 3M does with its 46 Technological Platforms than convert then in different products and brands.

Discontinuous Innovation: is about "reframing the way we think about an industry changing the dominant business model, hence the rules of the game. The power of the new way of framing the business is that it opens up a new trajectory along which all sorts of innovations begin to happen." As Schumpeter's says in his theory of innovation: it's a way of "Creative destruction". **glass smart™**, as business model can be considered here and it helped O-I on the movement of a B2B (Business to Business) to a B2B2C company (Business to Business to Consumer).

Level of Innovation: "Innovation is about knowledge, creating new possibilities through combining different knowledge sets". Such knowledge may already exist in our experience, based on something we have seen or done before. Or it could result in a process of search. This knowledge sets together into a successful innovation and it takes place under uncertain conditions. Managing innovations is about turning these uncertainties into knowledge. Incremental innovations have lower risk than radical innovations, because we are starting from something we know about and developing improvements in it

2. Innovation as a Core Business Process

This is one of the most important learnings an organization needs to apply after its leaders decide to "Innovate" and read this book: Transform Innovation into a core business process. Each organization must find its own particular solutions and develop this in its own context to Innovate.

Innovations vary widely, in degree of novelty, type of innovation (4P's), in the organization who is innovating (small, large), etc. But all of those has the same basic process or model operating (search, select, etc.).

However, we have to consider some aspects of the organizations:

- Innovations in services
- The extended enterprise

- Innovate is not for profit organizations
- Social Entrepreneurship
- Size of the organization
- Project based organization
- Networks and systems
- National, Regional, or local context.

For the objectives of this project, we only will talk about the size of the company, but you can refer to the book to have more information of the other aspects.

The size of the organization can be an advantage or disadvantage. The smallest organizations have in advantage agility, rapid decision making, informal culture, high quality communications, entrepreneurial spirit and risk taking, and limitations such resource constraints, lack of skills and experience, poor risk management, lack of long term strategy and direction, etc. This influence the way in which innovation is managed.

An increasing number of authors draw attention to the degree of novelty, more than these last organization aspects we just mentioned. It's about Do Better or Do Different, the two modes of innovate. **Do Better means:** Doing what we do but better. **Do different** is where the rules of the games have shifted and where managing innovation is much more a process of exploration and co-evolution under conditions of high uncertainty. But once and again, the basic model of the innovation process remains the same.

It might appear that it is impossible to manage something so complex and uncertain; and manage not means a predictable mechanism, it refers to create conditions within an organization under which resolution of multiple challenges under high levels of uncertainty is made more likely.

Success depend upon two ingredients: technical resources (people, equipment, knowledge, money) and the capabilities in the organization to manage them. Here comes the concept of "routines", the particular ways of behaving which become "the way we do things around here" as a result of repetition and reinforcement. It becomes important, in the innovation management, not only to build routines but also to recognize when and how to destroy them and allow new ones to emerge.

Learning to do this comes from recognizing and understanding effective routines and facilitating the emergence across the organization. And this learning process implies a building up of capability

over time. But the reality is, that the potential of innovations differs widely between organizations in their ability of innovate. There are a typology of firms ranging from firms which are "unconsciously ignorant" through to high performing knowledge based enterprises. The distinguishing feature is their capability to organize and manage the innovation process in its entirety, from search, through selection to effective implementation of new knowledge.

Type A: unconscious or unaware about the need of innovation. They do not know where or what they might improve.

Type B: recognize the challenge of change but are unclear how to go about the process. Their internal resources are limited (they often lack key skills and experience).

Type C: have a well-developed sense of the need for change and are highly capable of implementing new projects and take strategic approach to the process of continuous innovation. They lack the capability for radical innovation.

Type D: firms operate at the international knowledge frontier and take creative and proactive approach to exploiting technological and market knowledge for competitive advantage and do so via extensive and diverse networks. Here is where O-I is classified: A high performance based company which has everything is needed to accomplish a successful Innovation process.

So what is success?

It relates to the overall innovation process and its ability to contribute consistently to growth. Is not a one off success in the short term but sustained growth through continuous invention and adaptation. It is relatively simple to succeed once with lucky combination of new ideas and receptive market at the right time, but it is quite another thing to repeat the performance consistently.

The innovation challenge, as we saw before, has a basic model:

1. **Search:** detecting signals on the environment about potential for change. Most innovations result from the interplay of several forces, some coming from the need for change pulling through innovation and others from the push which comes from new opportunities and people interaction.

2. **Selection:** the choices made fit with the overall business strategy of the firm. The purpose of this phase is to resolve the inputs into an innovation concept which can be progressed further through the development organization.

3. **Implement:** turning those potential ideas into some kind of reality: a new product or service, a change in process, a shift in business model, and so on. At the early stages there is high uncertainty, but gradually, it is replaced by knowledge.

As the innovation develops so a continuing thread of problem finding and solving, takes place, gradually building up relevant knowledge around the innovation, and then further knowledge about this adoption can be used to refine the innovation.

The implementation phase has three steps: acquiring knowledge, execute the project, launch and sustain the innovation.

Acquiring Knowledge: involves combining new and existing knowledge to offer a solution to the problem. It involves both generation of technological knowledge and technology transfer. It requires an effective management of R+D: clear strategic direction, effective communication, integration of effort across different groups, etc.

Executing the project: this stage is the heart of the innovation process. It prepares the market for the final launch. It is during this stage that most of the time, costs and commitment are incurred, and its characterized by a series of problem solving dealing with expected and unexpected difficulties in the technical and market areas. In parallel, there is also a set of activities associated with preparing the market into which it will be launched. It involves collecting information on actual or anticipated customer needs and feeding this into the product development process, whilst simultaneously preparing the marketplace and marketing for the new product.

Launch and Sustaining Innovation: it brings the need to understand the dynamics of adoption and diffusion of products and services, to understand the buyer behavior. This process typically involves a sequence of awareness, interest, trial, evaluation, and adoption. Thus simply making people aware, via advertising, and so on of the existence of a new product, will not be sufficient. Converting awareness to interest, means forging a link between the new product concept and a personal need. Understanding user needs has always been a critical determinant of innovation success and one way of achieving this is by bringing users into the loop at a much earlier stage, a co-evolution of innovation with users.

Capture Value: if the product/service offering or process change fails, this offer valuable information about what to change for next time. Rothwell and Gardiner have other scenario called "re-innovation", essentially building upon early success but improving the next generation revised and

refined features. Amongst the mains requirements in this stage is the willingness to learn from completed projects. Projects are often reviewed and audited, but these reviews may often take form of an exercise in "blame accounting" and in trying to cover up mistakes and problems. The real need is to capture all the hand-won lessons, from both success and failures, and feed these through to the next generation.

3. Building the innovative organization

Steve Jobs said that innovation is about the people you have. Every human being comes with the capability to find and solve complex problems, and where such creative behavior can be harnessed amongst a groups of people with differing skills and perspectives extraordinary thing can be achieved. At the individual level, innovation has always been about exceptional characters who combine energy, enthusiasm and creative insight to invent and carry forward new concepts. Innovation is increasingly about teamwork and the creative combination of different disciplines and perspectives. Success come from people working together in high performance teams.

Everything starts with the Top Management Commitment. Is a Challenge to translate that commitment from concept to reality by finding mechanisms which demonstrate and reinforce the sense of management involvement, commitment, enthusiasm and support. Since much of innovation is about uncertainty, it follows that returns may not emerge quickly and that there will be a need for "patient money". The strategy has to focus not only in returns of investment but also in market penetration and growth or the strategic benefits. Successful management thus requires that the organization be prepared to take risk and to accept failure as an opportunity for learning and development. The message for senior management is much about leading through creating space and support within the organization as it is about direct involvement.

It is also important to create a favorable context. Rigid hierarchical organizations in which there is little integration between functions and where communication tends to be top down and one way in character are unlikely to be supportive of the smooth information flows and cross functional cooperation recognized as being important success factors. The higher the uncertainty and complexity in environment, the greater the need for flexible structures and process to deal with.

Another important element is the presence of key enabling figures. First, the technical knowledge. They will have the breadth of understanding of the technology behind the innovation and the ability to solve the many development problems likely to emerge in the long haul from laboratory or drawing board to full scale. This contribution also involves inspiration, motivation and commitment. The second key role is "Organizational Sponsor", influencers through the organization, other issues such a procuring resources or convincing skeptical or hostile critics elsewhere in the organization may need to deal with. Typically, this person has a power and influence and is able to pull the various strings of the organization (often from a seat of the board). Other key roles are: the "Team Leader" of course, the "Business innovator", someone who represent and bring to bear to broader market or user perspective; "Technological gatekeeper", collecting information from various sources and passing it on to the relevant people who will best able or most interest to use it.

Research on implementing **High Involvement Innovation (HII)** suggest that there are a number of stages in this journey, progressing in terms of the development of systems, a capability to involve people and also in terms of the bottom-line benefits. Each of these stages takes time to move through, and there is no guarantee that organizations will progress to the next level:

Level 1: "Unconscious HII". There is little, if any, HII activity going on, and when it does happen it is essentially random in nature and occasional in frequency. There is no formal attempt to mobilize or build on this activity.

Level 2: Represents an organization's first serious attempts to mobilize HII. It involves setting up a formal process for finding up and solving problems in structured and systematic way and encouraging people to use it.

Level 3: Represents the point at which HII makes a significant impact on the bottom line. The majority of "success stories" in HII can be found at this level. Two key behaviors need to be added to the basic suite: those of strategic deployment and monitoring and measuring. Strategy deployment involves communicating the overall strategy of the organization and breaking it down into manageable objectives towards which HII activities in different areas can be targeted.

Level 4: introduces a new element, that of "empowerment" of individuals and groups to experiment and innovate in their own initiative.

Level 5: is a notional end-point of the journey, a condition where everyone is fully involved in experimenting and improving things, in sharing knowledge and in creating and active learning organization.

O-I could be located at Level 2, in a starting point.

Going back to people, experiments indicate that teams have more to offer that individuals in terms of both fluency of idea generation and in flexibility of solutions development. "Team" means a combination of individuals who come together or who have been brought together for a common purpose or goal in the organization (different to "group" that means a number of people who are regarded as some sort of unity or are classes together on account of any sort of similarity). A team must collaborate in their professional work in some enterprise or in some assignment and share accountability or responsibility for obtaining results.

Highlight the importance of selecting and building the appropriate team for the task and the context. Because there are dangers in putting nominal teams together where unsolved conflicts, personality clashes, lack of effective group processes and other factor can diminish their effectiveness. Successful organizations were those which invested in multiple methods for integrating across groups and the cross functional team was one of the most valuable resources.

Key elements in effective high performance team working include:

- Clearly defined tasks and objectives.
- Effective team leadership.
- Good balance of team roles and match to individual behavioral style.
- Effective conflict resolution mechanism within the group.
- Continuing liaison with external organization.

Previous research also suggests a number of characteristics that promote effective teamwork:

- A clear, common and elevating goal.
- Results driven structure.
- Competent team members.
- Unified commitment.
- Collaborate climate.

- Standards of excellence.
- External support and recognition.
- Principled leadership.
- Appropriate use of the team.
- Participation in decision making.
- Team Spirit.
- Embracing appropriate change.

About the creative climate, the first is to recognize that creativity is an attribute which everyone possesses. Innovation in the initial flash may require a significant creative leap, much of the rest of the process will involve hundreds of small problem finding and solving exercises each of which needs creative input. Organizational structures are the visible artefacts of what can be termed an innovative culture - one in which innovation can thrive-. Culture basically equates to the pattern of share values, beliefs and agreed norms which shape behavior, it is "the way we do things round here". Management cannot change culture, but it can intervene at the level of artefacts, by changing structures or processes and by providing models and reinforcing preferred styles of behavior.

Some ideas to change behaviors are:

Idea time: is the amount of time people can use for elaborating new ideas. Individuals under time pressure are significantly less likely to be creative.

Challenge and Involvement: people find joy and meaningfulness in their work, and therefore they invest much energy. Leaders who provide feedback that is high on developmental potential. Intellectual stimulation by leaders can have a profound effect on organizational performance.

Trust and Openness: when there is strong level of trust, everyone in the organization dares to put forward ideas and opinions. Initiatives can be taken without fear of reprisals and ridicule in case of failure.

Risk Taking: in risk avoiding organizations people complain about boring, low energy jobs and are frustrated by a long, tedious process used to get ideas to action. People are frustrated because nothing is getting done. These conditions can be caused by individuals not feeling they need consensus in their organization. A remedy might include some team building and improving the reward system to encourage cooperation rather than competition.

Freedom: In a climate with much freedom, people are given autonomy to define much of their own work. If there is not enough freedom people demonstrate very little initiative for suggesting new and better ways of doing things.

Finally, the **Network.** Innovation has become an open process involving richer networks across and between organizations. Open innovation requires building such relationships with an extended cast of characters, including suppliers, collaborators, competitors, regulators and multiple other players.

The conclusion of this chapter is that all about "Innovation Energy":

an individual's attitude + a group's behavioral dynamic + and the support an organization provides **= Successful Innovation.**

The tree elements of the equation.

4. Developing an innovation strategy

According to Porter, firms must decide between two market strategies:

Innovation Leadership: where firms aim at being first to market, based on technological leadership. This requires a strong corporate commitment to creativity and risk taking, with close linkages both to major sources of relevant new knowledge, and to the needs and responses of customers.

Innovation Followers: where firms aim at being late to market, based on imitating or learning from the experience of technological leaders. This requires a strong commitment to competitor analysis and intelligence.

Technological leadership in firms does not necessarily translate itself into economic benefits.

Teece argues that the capacity of the firm to appropriate the benefits of its investment in technology depends on two factors: the firm's capacity to translate is technological advantage into commercially viable products or process; the firm's capacity to defend its advantage against imitators.

There are some factors which influence the firm's capacity to benefit commercially from its technology:

Secrecy: an effective form of protection but it is unlikely to provide absolutely protection. Engineers are a professional community, who talk to each other and move from one firm to other so that information and knowledge inevitably leak out. Accumulated tacit knowledge: can be long and difficult to imitate.

Lead times and after sales service: is the major source of protection against imitators. Taken together with a strong commitment to product development, they can establish brand loyalty and credibility, accelerate the feedback to customer use to product improvement, generate learning curve cost advantages and therefore increase the cost entry for imitators.

The learning curve: in production generates lower costs and particular and powerful form of accumulated and largely tacit knowledge that is well recognized by practitioners.

Complementary assets: the effective commercialization of an innovation very often depends on assets or competencies in production, marketing and after sales to complement those in technology.

Product complexity

Standards: the market leader normally has the advantage in a standards war. Competing firms can adopt either "evolutionary" strategies minimizing switching cost for customers or "revolutionary" strategies based on greatly superior performance price characteristics, such that customers are willing to accept higher switching costs.

Pioneering radical new products: a pioneer's strategy appears more successful in markets where the purchasing frequency is high, or distribution important, but confers no advantage where there are frequent product changes or high advertising expenditure.

Strength of patent protection

Hamel G. and Prahalad C.K. developed the notion of "core competencies" based on:

- The sustainable competitive advantage of firm resides not in their products but in their core competences: the real sources of advantages are to be found in management's ability to consolidate corporate-wide technologies and production skills into competencies that empower individual business to adapt quickly to changing opportunities.

- Core competencies feed into more than one core product, which in turn feed into more than one business unit.

- The importance of associated organizational competencies is also recognized: "Core competence is communication, involvement, and a deep commitment to working across organizational boundaries".

- Core competencies require focus: Few companies are likely to build world leadership in more than five or six fundamental competencies. More than that has probably not produced a list of core competencies.

- The notion of core competencies suggest that large and multidivisional firms should be viewed not only as a collection of strategic business units (SBUs) but also as bundles of competencies that do not necessarily fit tidily in one business unit.

The great strength of the approach of Hamel and Prahalad is that it places the cumulative development of firm specific technological competencies at the center of the agenda of corporate strategy.

It is important to distinguish firms where IT is a core technology and a source of distinctive competitive advantage (e.g. Cisco) from firms where it is a background technology, requiring major changes but available to all competitors from specialized suppliers, and therefore unlikely to be a source of distinctive and sustainable competitive advantage.

5. Innovation networks

It's easy to think of innovation as an "act". In reality taking any good idea forward relies on all sorts of inputs from different people and perspectives. But increasingly it's also about links between organizations, developing and making use of increasingly wide networks. Smart firms have always recognized the importance of linkages and connections, getting close to customers to understand their needs, working with suppliers to deliver innovative solutions, linking up with collaborators, research centers, even competitors to build and operate innovation systems. This networks becomes the key requirement for innovation.

A network can be thought of a consisting of a number of positions or nodes, occupied by individuals, firms, business units, universities, governments, customers or other actors, and links or interactions between these nodes. A network perspective is concerned with how these economic actors influenced by the social context in which they are embedded and how actions can be influenced by the position of actors.

Being in an effective innovation network can deliver a wide range of benefits beyond the collective knowledge efficiency. These include getting access to different and complementary knowledge sets, reducing risks by sharing them, accessing new markets and technologies and otherwise pooling complementary skills and assets. Without such networks it would be nearly impossible for the lone inventor to bring his or her idea successfully to market. And it's one of the main reasons why established business are increasingly turning to cooperation and alliances to extend their access to these key innovation resources.

Open innovation is when you create and combine knowledge from both inside and outside the firm. Because, as not all the smart people work for you, external ideas can help create value.

Innovation networks can be broken down into three stages of a life cycle:

Set-up state: Issues here are around providing the momentum for bringing the network together and clearly defining its purpose.

Operating stage: The key issues here are about trying to establish some core operating processes about which there is support and agreement. These need to deal with: network boundary management (how the membership of the network is defined and maintained), decision making (how decisions get taken at the network level), conflict resolution, information processing, knowledge management, motivation, risk benefit sharing, coordination.

Sustaining or closure stage: networks need not last forever, sometimes they are set up to achieve a highly specific purpose and once this has been done the network can be disbanded.

6. Decision making under uncertainty

Of all the things we could do, what are we going to do? Organizations cannot afford to innovate at random, they need some kind of framework which articulates how they think innovation can help them survive and grow and they need to be able to allocate scarce resources to a portfolio of innovation projects based on this view.

The challenge of innovation decision making is made more complex by the fact that isn't a simple matter of selecting amongst clearly defined options. By its nature innovation is about the unknown, about possibilities and opportunities associated with doing something new and so the process involves dealing with uncertainty.

Innovation management tries to convert that uncertainty at the outset to something closer to a calculated risk. Central to this process is knowledge, this is what converts uncertainty to risk. The more we know about something, the more we can take calculated decisions about whether or not proceed.

In innovation management the challenge is to invest in acquiring early knowledge (through technological R+D, through market research, competitor analysis, trend spotting, etc.), to get early information to feed decision making.

Experience suggest some form of structured development system with clear decision points and agreed rules on which to base go/no go decisions, is a more effective approach. This model is called "Stage Gate", it essentially involves putting in a series of gates at key stages and reviewing the project's against clearly defined and accepted criteria. Only if it passes will the gate open, otherwise the project should be killed off or at least returned for further development work before proceeding.

When we are deciding about incremental innovation, the process of deciding is relatively straightforward. Since this involves comparing something new with something which already exist we can set up criteria and measure against these. One area when systematic management of incremental innovation becomes important is in "high involvement" systems where a large proportion of the workforce becomes engaged in innovation. If we are successful in persuading most of the workforce to make innovation proposals, then how will manage the volume of ideas which result? One solution increasingly used is online suggestion schemes and crowdsourcing approaches to engage the community itself in rating, commenting and supporting promising ideas, there are also other solutions mentioned at the book.

When the decision is not incremental innovation and the options move towards the more radical end so the degree of resource commitment and risk rises and decision making resembles more closely a matter of placing bets. At the limit the organization faces real difficulties in making choices about new trajectories in moving outside the box in which its prior experience and the dominant technological and market trajectories place it.

The problem is that for long the decisions are taken within a framework "their box", they are effective buy they break down when challenge comes from outside that box, so the firms have to "reframing", change their model, view the world in different ways and change the ways they make selection decisions as a result. And they have to do it not too late.

7. Building the innovation case

A business plan can help to make more explicit the risk and opportunities, expose any unfounded optimism and self-delusion, and avoid subsequent concerning responsibilities and rewards.
A typical formal business plan will include the following sections:

- Details of the product or service
- Assessment of the market opportunity
- Identification of target customers
- Barriers to entry and competitor analysis.
- Experience, expertise and commitment of the management team.
- Strategy for pricing, distribution and sales.
- Identification and planning for key risks.
- Cash flow calculation, including break even points and sensitivity.
- Financial and other resource requirements of the business.

Forecasting has a central role in business planning for innovation. If conducted in the right spirit, forecasting should provide a framework for gathering and sharing data, debating interpretations and making assumptions, challenges and risk more explicit.
Leading indicators can improve the reliability of forecast, and are useful guidepost to future trends in some sectors. There is exploratory forecasting to explore a range of future possibilities:

1. Customer or market surveys
2. Internal analysis, (e.g. brainstorming).
3. Delphi or expert opinion
4. Scenario development

According to Mitchell and Hamilton, there are three categories of innovation that large firms must finance:
Knowledge building: this is the early stage and relatively inexpensive research for nurturing and maintaining expertise in fields that could lead to future opportunities or threats.

Strategic positioning: they involve applied R+D and feasibility demonstration, in order to reduce technical uncertainties, and to build in house competence, so that the company is capable of transforming technical competence in profitable investment.

Business investment: this is the development, production and marketing of new and better product, processes and services. It involves relatively large scales expenditures, evaluated with conventional financial tools. What are the potential cost and benefits in continuing with the project?

8. Capturing the benefits of innovation

One of the central problems of managing innovation is how to create and capture value.
Technological leadership in firms does not necessarily translate itself into economic benefits. The capacity of the firm to appropriate the benefits of its investment in technology depends on: its ability to translate its technological advantage into commercially viable products or processes, for example, through complementary assets or capabilities in marketing and distribution, and its capacity to defend its advantage against imitators.
Other factors can be influenced only slightly by the firm's management and depend much more on the general nature of the technology, the product market and the regime of intellectual property rights.
Firms need to balance the desire to protect their knowledge with the need to share aspects of this knowledge to promote innovation. By influencing the shape or architecture of an emerging innovation in this way, a firm can capture a small proportion of a potentially very large pie, rather than focusing on the protection of a much smaller pie.
One of the key issues is the relationship between individual and organizational learning, and how the former is translated to into the latter, and ultimately into new processes, products and business. This is how knowledge is managed and this involves five critical tasks:
Generating and acquiring new knowledge: experimentation is a more systematic approach to learning, a strategic of learning through incremental trial and error acknowledges the complexities of existing technologies and markets, as well as the uncertainties associated with technology and market change and in forecasting the future.

Identifying and codifying existing knowledge: what we mean by knowledge?

DATA: it is a set of discrete raw observations, numbers, words, records; of easy structure, store and manipulate electronically.
INFORMATION: is the data that has been organized, grouped or categorized on some kind of pattern. In most cases add value to the data.
KNOWLEDGE: is information that has been contextualized, given meaning and therefore made relevant and easier to operationalize.

There are two types of knowledge: explicit and tacit or implicit. Explicit is which you can codified, expressed in numerical, textual or graphical terms. Tacit, is personal, experiential, hard to formalize or communicate.
Storing and retrieving knowledge: storing knowledge is not a problem, even now that the electronic storage and distribution of data is so cheap and easy. The biggest hurdle is the codification of tacit knowledge. The other common problem is to provide incentives to contribute, retrieve and reuse relevant knowledge.
Sharing and distributing knowledge across the organization: Knowledge sharing and distribution is the process by which information from different sources is shared and, therefore, leads to new knowledge or understanding. To connect knowledge with the organization:

- Converting data and information to knowledge: identifying patterns and associations in databases.

- Converting text to knowledge: through synthesis, comparison and analysis.

- Converting individual to group knowledge: sharing knowledge requires a supportive culture, appropriate incentives and technologies.

- Connecting people to knowledge: through seminars, workshops or software's agents.

- Connecting knowledge to people: pushing relevant information and knowledge through intranets, agent systems.

- Connecting people to people: creating expert and interest directories and networks, mapping who knows what and who knows who.

- Connecting knowledge to knowledge: identifying and encouraging the interaction of different knowledge domains, for example through common projects.

Exploiting and embedding knowledge in processes, products and services: David Tranfield and his collages map the different phases of the innovation process to identify the knowledge routines in each of three innovation phases:
Discovery: searching the internal and external environments, to pick up and process signals about potential innovation. These could be opportunities arising of research activities, regulative pressures, or the behavior of competitors.
Realization: requires selecting from this set of triggers for innovation those activities to which the organization will commit resources. How successfully implement the innovation, growing it from an idea through various stages of development to final launch as a new product or service in the external market place or new process or method within the organization.
Nurturing: involves maintaining and supporting the innovation through various improvements and also reflecting upon previous phases and reviewing experiences of success and failure in order to learn about how to manage the process better, and capture relevant knowledge from the experience.

In some cases, knowledge in particular in its more explicit or codified forms, can be commercialized by licensing or selling the intellectual property rights (IPR), rather than the more difficult and uncertain route of developing new processes, products or business. The book explores the intellectual property deeply.

9. Capturing learning from innovation

Successful innovation implies the completion of this risky, adventure and a happy ending with valuable returns on the originals investments. But it also provides an opportunity to reflect on the journey and to take stock of the knowledge acquired through an often difficult experience. It's worth

doing this because the knowledge gained through such reflection can provide a powerful resource to help with the next innovation journey.

Not all innovation is successful, but the opportunities for learning from failure are also considerable. Understanding what doesn't work on a technological level, or recognizing the difficulties in a particular marketplace which led to non-adoption is useful information to take stock of and use when planning the next expedition. Experience is an excellent teacher, but its lessons will only be of value if there is a systematic and committed attempt to learn them.

Innovation management is not a matter of doing one or two things well, but about good all round performance:

- Is strategic based.
- Depends on effective internal and external linkages.
- Requires effective enabling mechanism for making change happen.
- Only happens within a supporting organizational context.

Research and experience point to three essential ingredients in innovation strategy:

- The position of the firm, in terms of its products, processes, technologies and the national innovation system in which is embedded.

- The technological paths open to the firm given its accumulated competencies.

- The organizational processes followed by the firm in order to integrate strategic learning across functional and divisional boundaries.

Finally, innovation depends on having a supporting organizational context in which creative ideas can emerge and be effectively deployed. Building and maintaining such organizational conditions are a critical part of innovation management, and involve working with structures, work organization arrangements, training and development, reward and recognition systems and communication arrangements.

But in a constantly changing environment we need a "dynamic capability", is when we are able to adapt our framework. It is a process of constant modification and development of our innovation

capability. This processes requires a learning loop, to changing environment as a result of lessons learned:

Structured and challenging reflection on the process: what happened, what worked well, what went wrong and so on.

Conceptualizing: capturing and codifying the lessons learned into frameworks and eventually procedures to build on lessons learned.

Experimentation: the willingness to try and manage things differently next time, to see if the lessons learned are valid. Honest capture of experience so we have raw material on which to reflect.

If we are to extract useful learning from successful or unsuccessful innovation activities, we need this tools:

Post-project reviews (PPRs): are structured attempts to capture learning at the end of an innovation project. They work well when there is structured framework against which to examine the project, exploring the degree to which objectives were met, the things which went well and those which could be improved, the specific learning points raised and the ways in which they can be captured and codified into procedures which will move the organization forward in terms of managing technology in future.

Benchmarking: is the general name given to range of techniques which involves comparisons. It works in two ways, first, it provides a powerful motivator since comparison often highlights gaps which might well lead to problems in competitiveness later. In this sense it offers a structured methodology for learning and is widely used by external agencies who see it as a lever with which to motivate particularly smaller enterprises to learn and change. It provides a powerful focus for the operation of learning networks since it offers a framework around which shared learning can be targeted and monitored and across which experiences can be exchanged.

Another important thing is to audit. W. Edwards Deming said: "If you don't measure it you can't improve it". The analogy can be draw with financial auditing. We can construct a checklist of questions to ask of identify where things could be improved. The purpose of such auditing is an effective learning cycle through adding the dimension of structured reflection.

The ability to use the tools is needed to make a wide range review of the factors affecting innovations success and failure, and how management of the process might be improved

- An audit framework to see what you did right and wrong.

- A checklist to see if you are doing the right things.
- A benchmark to see if you are doing them as well as others.
- A guide to continuous improvement of innovation management.
- A learning resource to help acquire knowledge and provide inspiration for new things to try.
- A way focusing on sub systems with particular problems and then working with the owners of those processes and their customers and suppliers to see if the discussion cannot improve on things.

As a conclusion, this chapter reflects what was consider important, after analyzing the four company as benchmark or study cases in order to finalize the modeling of the Innovation process for O-I. Hopefully after the reader passed this chapter, could understand why Innovation is important and what are the key elements to consider.