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## Innovation

### Abstract

innovation is the artery and the influencing factor in society's and it is the solution to many diseases, technical and economic ills. Such as conservation is the general mentality; our economic climate is too weak and we are now going through the CORONA PANDEMIC and we see many young people accepting technology, so the innovation process has to be done, as this helps in the process of solutions to many problems in society. That the challenges are much more complicated and therefore, a single remedy will not work. This is because innovation is a concept that lends itself to a multitude of meanings. Is that innovation is closely linked to economic growth. This can be explained the innovation is the rate of economic growth will increase, innovation leads to the development and production of new products and services, thus creating demand. In this way, as economic activity increases so does growth.
In this paper we taking about the different aspects of innovation in detail in order to set straight this one-sided view of the concept.

## Introduction

**Innovation can be from an organizational process perspective in three different ways.** 1- **large companies and organizations may have an R&D department which has innovation as its core activity, example, physics laboratory of Philips.** 2- **small companies and whole organization may be have a separate R&D department, like, the Dutch company Nedap.** 3- **the individual.**
**In each case individuals are involved. Innovation have to be conceived, worked out and realized. On all kinds of levels this requires knowledge, and knowledge is something that only people can develop, use and maintain three approaches take place with each other within the same organization. In any case, one essential condition is the presence of individuals who are willing to try things, who possess knowledge and skills, and crucially, who aren't afraid to fail as the failure rate of innovations greatly exceeds the success rate.**

**Innovations are important for both external and internal reasons. By external reasons we mean that within an organization's environment ( which can include other companies in the form of purchasers or suppliers and also consumers and customers ). Common motives for responding to these external reasons are competitive advantage and profit maximization.**
**By internal reasons for organizations to engage in innovation: for example, as a way of improving existing products and services or unlocking employees creatively. The internal reasons basically come down to interacting and dealing adequately with the real motivation of employees.**

**It is often the case that internal and external stimuli occur real. However, it is wise to keep these stimuli apart because they both have different advantages and disadvantages. An advantage of an internal stimuli is that it is initiated by the organization itself which mean that employees are more likely to identify with it. Disadvantage something promising is achieved without knowing whether it will work externally. An advantage of an external stimuli is that one continuously has to adjust to changing external circumstances and this is exactly what an adaptive system, such as an organization, should do. A disadvantage of external stimuli is that they have no individual quality ( Von Hippel 1988)** [1]

**Definition of innovation**

there are many definitions of innovation. General these consist of three elements.

1- change or doing things in a different way ( Schumpeter, 1934 ) [2] and thus undertaking something new.

2- newness this is often interpreted in an absolute way. This element is dominated by the technical approach. This is because once a device, a machine or design has been invented it is easy to repeat the process. The disadvantage of a merely technical viewpoint is that it fails to take account of the human dimension which requires that people actually have to understand and accept the innovation.

3- it is that of performance improvement. Schumpeter links performance to economic achievement. According to this one-sided economic view, innovation creates value in teams of rewards for entrepreneurs. However, this view hasn't remained unchallenged. It could be both innovative and economically highly profitable to make new products with the aid of highly polluting production processes. Such an approach to value adding couldn't however, be described as sustainable.

The OECD (1996:9) [3]: gives the following description of innovation

it is the implementation / commercialization of a product with improved performance characteristics such as to deliver objectively new or improved services to a customer. A technological process innovation is the implementation / adaptation of new or significantly improved production or delivery methods. It may involve changes in equipment, human resources, working methods or a combination of these.

The Nonaka ( 1994:14 ) [4] anthers interesting description of innovation

it is the better understood as a process in which the organization creates and defines problems and then actively develops new knowledge to solve them.

**Phases within the innovation**

**from the viewpoint of both the individual " psychology " and the organization " management, economic or sociology " an innovation has two phases:**

**1- invention or creation. 2- implementation. ( Nonaka & Takeuchi 1995 ) [5] During the phase of invention or creation an individual or in most cases a group of individuals conceives something new. The actual process of creation is often considered as taking place at the individual level, but defining creation is difficult. ( Boden 1994 )[6] uses the dictionary definition of creativity as " bringing something into existence or making something out of nothing ". Howard Gardner ( 1984 )[7] defines the creative person as someone who regularly solves problem, gives new products shape or thinks of new questions in fields and in ways that are perceived as new and which are ultimately accepted in a specific cultural environment.**

**Three phases of a simplified innovation process**
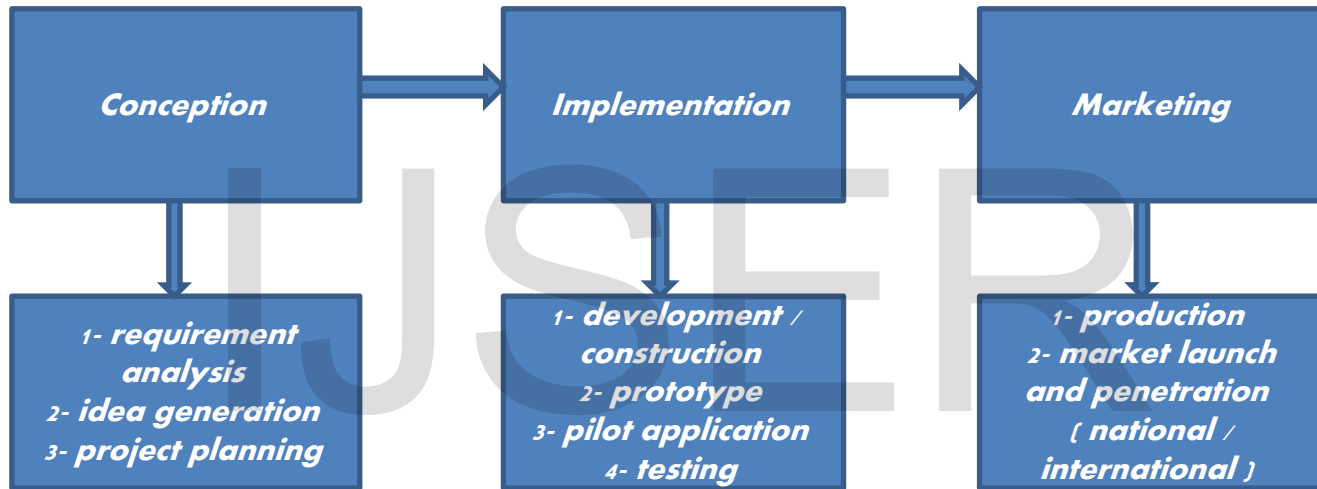
## *Processing innovation*

*every organization invests in innovation in order to change. Organizations put aside a proportion of turnover to change products, processes and services. Particular objectives must be achieved because of this investment. However, a very large percentage of innovation activities fail to meet these objectives. The reasons behind failure give us clues about how avoid such failure in the future.*

*Each year organizations spend a significant amount of turnover on innovation. The amount of investment can vary from as little as 0.5% of turnover for organizations that operate in stable marketplaces to more than 20% of turnover for organizations in emerging or turbulent marketplaces. The level of expenditure depends on the aspirations and ambitions of the individual organization and whether it has growth potential. The average expenditure across organization is just under 4% of annual turnover ( European commission, 1996 ) [8] For an organization with a turnover of $ 1 billion, this represents an annual investment of approximately $ 40 million. This budget typically is spread across various functions, including product design, information system, manufacturing system, and quality assurance, to allow innovative actions to be undertaken. As the innovation budget is often based on a percentage of forecasted turnover, three potential outcomes are possible.*

*1- forecasts are correct, and thus the allocated budget is also correct, allowing planned innovation to be undertaken.*

*2- the actual turnover exceeds the forecast, resulting in a budget that allows a greater number of innovative initiatives to be undertaken.*

*3- the actual turnover is less than that forecasted, resulting in insufficient budget to undertake the planned innovative projects.*

**The process of innovation can be described in terms of the interactions between four key sub processes ( Figure 3 ):**

**\* idea generation**
**\* opportunity recognition**
**\* development**
**\* realization**

**two related subprocesses are associated with opportunity recognition: organizational goals and available resources. In addition, there is another subprocess that isn't illustrated in Figure3, but underpins all processes: learning, the learning process permeates each of the processes, from ideas generation to realization.**
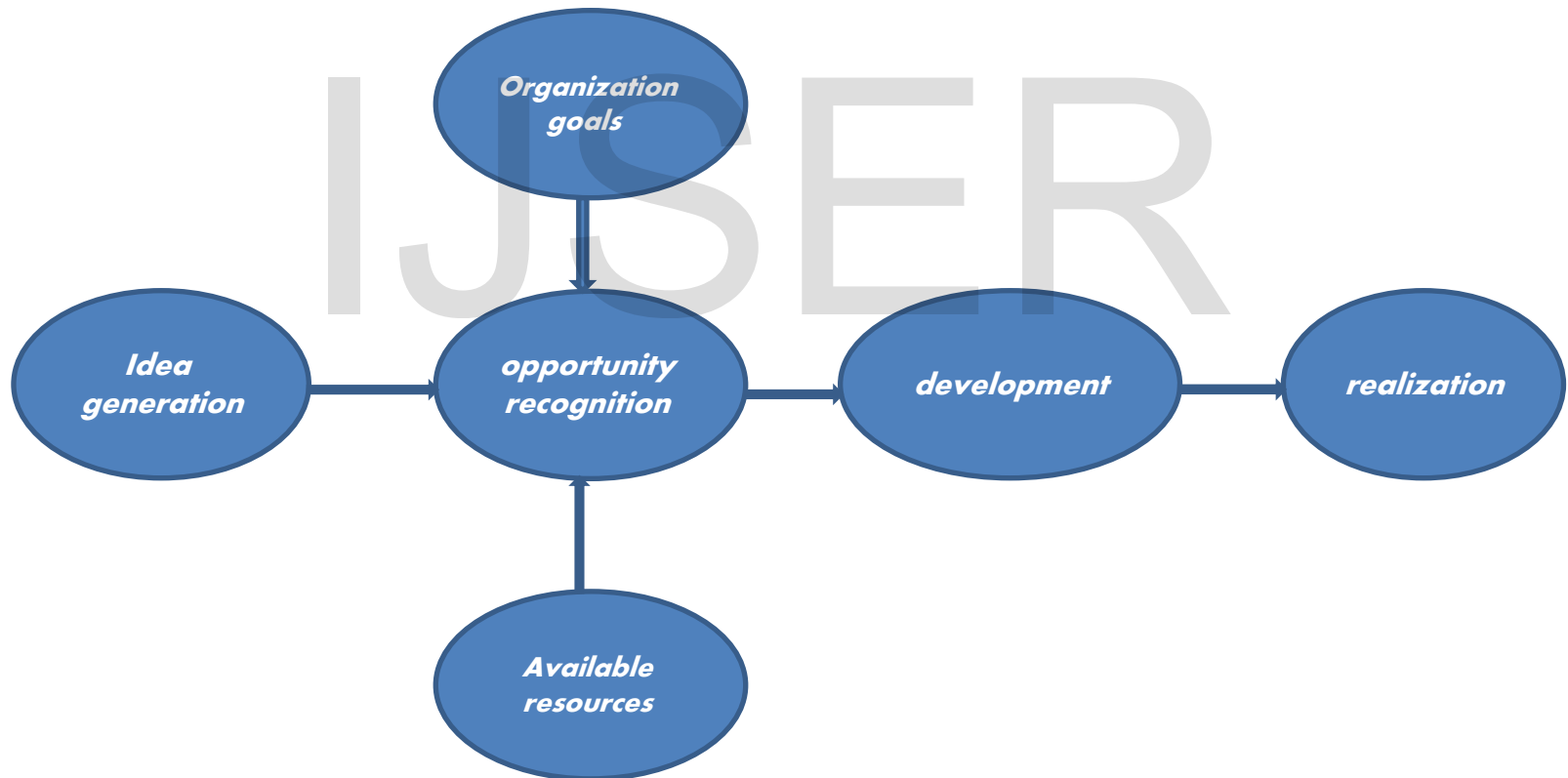
### Idea generation

The first stage perspective of the innovation process relates to the creative activity of generating an opportunities idea. This stage continuous scanning of the internal and external environment for threats and opportunities that might be developed into an innovation by the organization. Maybe this stage new idea and evaluating solution to identified problems. An organizational culture that encourages creativity and empowerment can significantly support this phase of the process. Ideas can be also stimulated by the goals of the organization or an unanticipated opportunity. Various stimuli can lead to the creation of an idea and range from reading. Magazines and observing problems to visiting other organizations and having informal discussions with colleagues and customers.

### Opportunity recognition

The second stage of the process is opportunity recognition, in which the opportunity of developing the idea into a new product, process, or service is assessed and evaluated relative to order opportunities. This phase of the process involves deciding which innovative ideas will be pursued by the organization and which are deemed outside its interest. Evaluation of prospective innovations isn't a onetime event but occurs periodically during the innovation process to ensure that the organization is investing in positive innovation. Cooper ( 1986 ) [9] refer to these decision points as stage gates, where unsuitable initiative are eliminated to allow extra resources to be directed toward more suitable innovation. The difficulty in this phase of the process is that the organization doesn't have a vision to see into the future and therefore, can't know for certain which ideas will be winners or losers. Members of the organization can only make the most enlightened decision they can, based on available knowledge, and continue to periodically screen their portfolio of developing innovation for appropriateness.

### Realization

*The objective of the realization phase of the process is to develop an innovation for the market that meets customers needs and is readily adopted. When the organization is developing a process innovation, the market can be said to be internal. Consequently, the realization phase encompasses activities such as commissioning, validation, and training to facilitate its successful adoption.*

### Learning

*learning is the final sub process in the innovation process. It requires the organization to analyze the previous phases of the innovation process and identify areas where the process can be improved. In this way, even innovation actions that are abandoned or end in failure can be beneficial because the organization can learn from its mistakes and avoid repeating them in the future. Similarly, the new knowledge acquired from undertaking the prospective innovations can also be used as input to the idea generation phase that may lead to future innovation. Over time the organization's effectiveness at managing its innovation process improves,*

### innovation knowledge

*The innovation funnel illustrated in figure 3.1 can be expanded to include of many ways in which goals, actions, teams, and results can be defined and codified in a simple knowledge management system.*

*Goals can be statements*
*Actions can be problems*
*Teams can be individuals*
*Results can be exception*
*Communities can be policies*

## Development

*If an opportunity is recognized as appropriate for the organization, then the idea moves to a new stage where it can be developed further. This phase involves the development of the idea or solution into a potential innovation that is ready for launch to its internal or external market. The development of an innovation can be highly resource intensive for any organization. The selection of innovation by an organization is constrained by the budget and the existing portfolio of innovation actions. Certain innovations may require competencies and skills that are scarce or even absent from the organization, and this scarcity can higher the implementation of certain innovations. Organizations must carefully manage the innovative actions, ensuring that they are adequately resourced to ensure success. The development phase of the innovation is usually undertaken as a team approach. Key activities of this phase can include experimentation, design and development, testing, market analysis, and prototyping. At the end of the development phase, the initial idea has been developed into a tangible product, process, or service that the organization view as capable of meeting user needs. Many potential innovations wait at the end of the development phase for market conditions to be right before they move to the realization phase.*
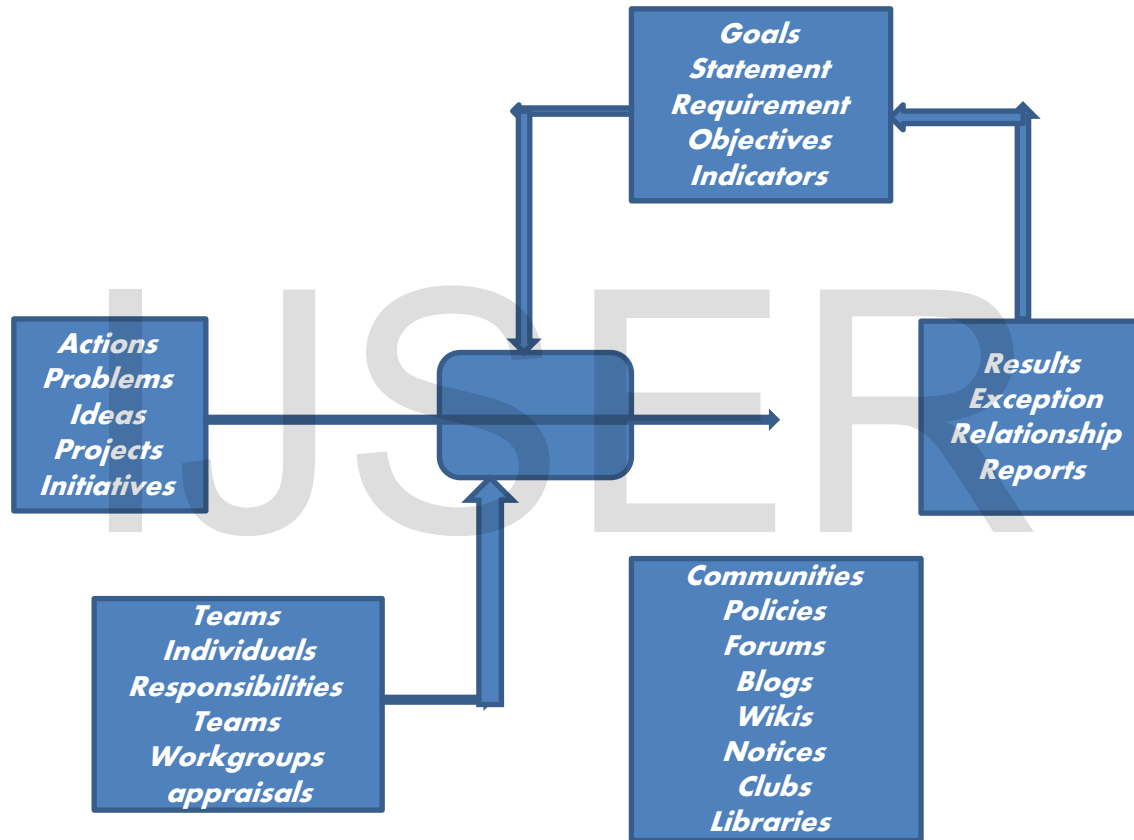
**Figure: 3. Innovation Funnel Expanded**

## Goals of innovation

The principle goals required by an organization in return for this investment vary between organizations. The following have been found across a large number of manufacturing and service organizations and ranked in order of popularity, with the first goal being common to most organizations ( European Commission, 1996 ) [8]

1- improved quality

2- creation of new markets

3- reduced labor costs

4- improved production processes

5- reduced materials

6- reduced environmental damage

7- replacement of products or services

8- reduced energy consumption

9- conformance to regulations

the first goal suggests that the most common reason for organizations to invent in changes to products, processes, and services is to improve quality. Most of these goals range across improvement to products, processes and services and dispel a popular story that innovation deals mainly with new product development. Most of the goals could apply to any organization, be it a manufacturing facility, marketing firm, hospital, or local government.

## Problem – solving, innovation and knowledge

Our first point of departure has been that of the individual. It is always individuals who, in one way or another, carry out activities. And this also applies to innovations. The individuals are, however, not economic subjects but human information processors with all kinds of cognitive possibilities and limitations ( Newell & Simon 1972 ) [10] This is reflected by their ways of problem-solving, co-operation and the exchange of knowledge. People are rational to a limited degree, they can't know everything and, even if this were the case, they wouldn't be able process all this information cognitively ( Simon, 1960 ) [11] This mean that often people settle for solutions that are satisfying rather than for those that are optimal.

The perspective we have on innovations as such is, following Simon, that of problem-solving. Whenever a problem has to be solved, it must first be observed. We could give a complex description of what a problem is, but what it basically comes down to is the observation of a difference between a present situation and a desired situation. The observation of a discrepancy is the motivator for seeking new possibilities ( March and Simon 1958 ) [12] An innovation will not be initiated if the current situation is experienced as sufficient. People, are, in this respect, satisfiers ( they settle for what is sufficient ) rather than optimizers ( they only settle for the best ). This is in line with people's limited cognitive processing capabilities and the principle of the least amount of effort ( March & Simon 1958 ) [12]

According to Newall & Simon ( 1972 ) [10] problem- solving consist of two main types.

1- a problem space has to be defined and

2- within a particular problem space the best solution

( in practice, often the most sufficient ) has to be found. Given a problem space that is relatively well known, most human activities entail the second step- finding solutions. This is no easy task, however, it can involve a great deal of thinking and investigation.

*The two steps in problem-solving processes are also called the phases of exploitation and exploration (March 1991) [13] Exploitation is then the search for new solutions in an already existing or slightly adjusted problem space, whereas exploration comes down to creating new problem spaces. A contradiction strongly arises here. March himself indicates that exploration and exploitation have to be placed on a continuum as two poles of extremity. This makes it possible to consider or rephrase a radical innovation as exploration and an incremental innovation as exploitation.*

*The different phases in innovation, the kinds of innovation and the psychological and sociological perspectives on innovation don't change the fact that innovation is actually knowledge creation. This means that in any discussion on innovation, knowledge is central. To put it simply, knowledge is both the primary source and the outcome of an innovation. It suffices to limit ourselves to the discussion of the various phases in innovation when dealing with knowledge. While doing this we make no choice between individuals and teams. In each of the phases both of them occur with a different emphasis. Apart from creating knowledge, the key activity in innovation is sharing knowledge. No matter how brilliant a new invention or service may be, if it isn't transferred, shared or used, the innovation will not be successful.*

*From a knowledge management perspective the following phases can be distinguished:*

*1- knowledge creation*

*2- knowledge encoding*

*3- knowledge storage and maintenance*

*4- knowledge access and availability*

*5- knowledge use*

*elaborating on our objective to stimulate the ( sustainability of knowledge ), it should be obvious that sustainability will increase as the phases are better connected with each other, are more transparent and have the proper organizational forms.*
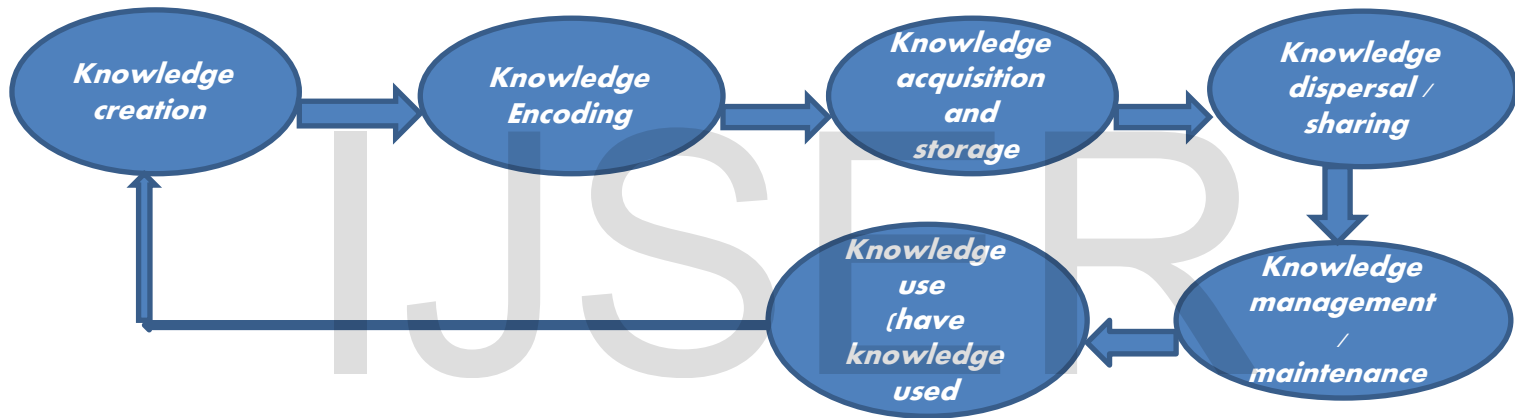
*Figure 2.1* **The consecutive knowledge phases of innovation**

*With this brief explanation of the essential importance of knowledge in innovations we based on the foregoing we can draw the following conclusions:*

*1- Innovation is a form of problem-solving whereby a distinction is made between expanding a problem space ( exploration ) and searching within the problem space ( exploitation ).*

*2- regardless of what technicians-solving and economists might say about the subject, an innovation is and remains the work of people, this means that attention should explicitly be paid to the way in which people think and reason, the way in which they are organized and the way in which their co-operation is structured*

*3- Innovation can't be measured objectively. The measurement depends on the collection level of people, team, department, organization, network and country. On each of these levels different variables to be measured can be indicated.*

*Social innovation through information provision*

*we will discussion here how sharing information within an organization contributes to social innovation by contributing to employee empowerment. ( Looise, 1996) [14] defined the social innovation as the international introduction and employment of novel ideas, activities, services and processes that aim to meet social needs of individuals, groups and organizations within society; and to advance social relationship and social organization. Looise argues that social innovation, technological innovation, economic innovation are inextricably related, each being necessary elements of innovation in organizations. Advancements in information technology ( IT ) could simply be seen as technological innovations that mostly drive process changes in organization. Figure 1 shows us how the increased ability and desire to generate and share information through IT could benefit social innovation in the shape of enhanced employee empowerment through participation in decision-making.*
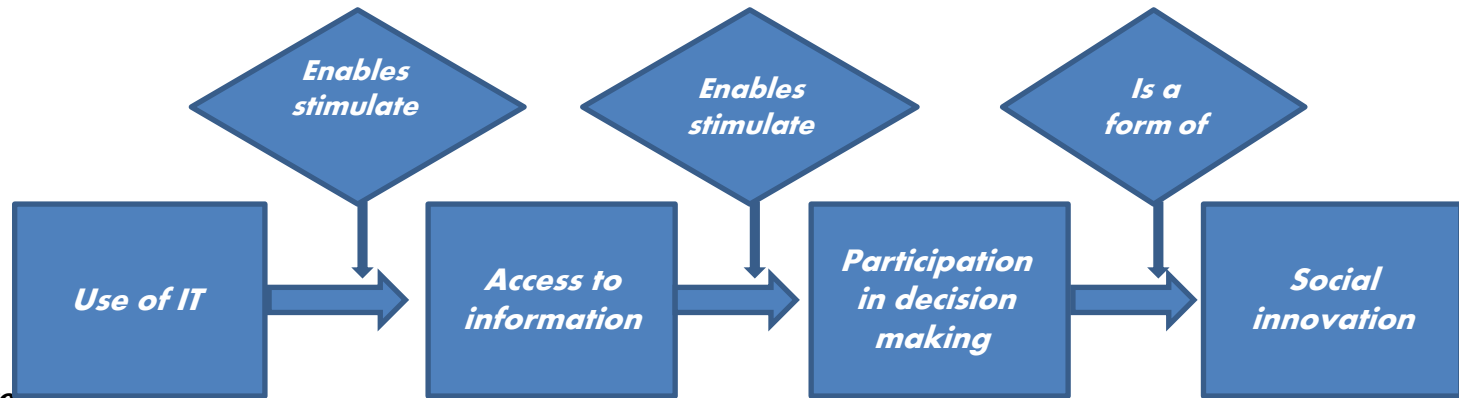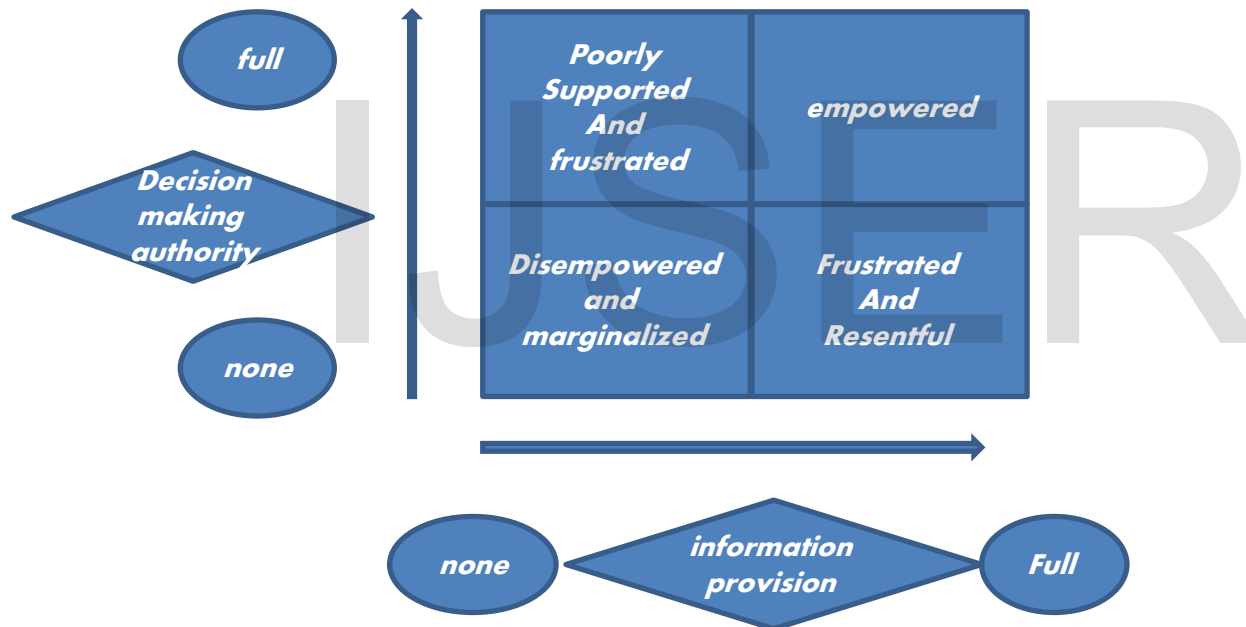
**Figure 1**

**information systems and employee decision-making**

**Checkland & Holwell, (1998) [15] Explore the nature of information and information system in organization, and particularly the academic study of it. They see information system (IS) as sets of interrelated components including technology, people, processes and procedures. Existing to serve, help or support people taking action in the real world. The interest that of employees making or being meaningfully involved in making-decisions at any level in their organization. These are decisions that are often referred to as managerial such as resourcing, scheduling, coordinating, controlling and planning ( cf. Fayol's classic definition of management, Fayol, 1917/ 1947 [16] and they can be operational, tactical or strategic. Being managerial in nature doesn't make such decisions the sole domain of managers though. Depending on organizational design decisions, as well as culture ( see e.g. Ahrens & Mollona, 2007 ) [17] making decisions and control in organizations can be hierarchical and centralized ( all decisions made by managers ), or more democratic and autonomous ( all, or most decisions made, at least in part, by employees ). Providing employees with information for decision-making will only lead to empowerment if they are also given authority to make decisions. This is shown in Figure 2, below.**

*The Figure also highlights that having decision-making authority without being provided with adequate information leads to employees being poorly supported and being frustrated. If employees have the information, but lack the authority, they will be frustrated and resentful. Finally, not having either leads to disempowered and marginalized employees.*



**Figure 2: empowerment as a function of authority and information provision.**

*To explore the potential of IT to empower employees, we will focus on the perspective of control. Control is the organizational function that wants to ensure that individual activities in an organization are aligned with the overall interests of the organization ( e.g. Tannenbaum, 1968 in Snell, 1992 )[18] All control systems rely on information to establish whether each employees performance is sufficiently aligned, both with corporate goals and with other employees performance. The relationship between control and the use IT has also become significant because more business processes are mediated by information technology ( Orlikowaki, 1991 )[19] In addition, information technology (IT), as used to support information society (IS), creates an enhanced capacity to monitor personal detail, often invisibly ( Lyon, 1993 ) [20] even though in practice such capabilities are often limited ( see e.g. Bain & Taylor, 2000 ) [21]*

*Different approaches to management control can be distinguished, range from very hierarchical and management dominated, to very democratic and allowing employee autonomy. Generally, three classic approaches to management control are considered: input control, output control, and behavior control ( e.g. Ouchi & Maguire, 1975; Snell, 1992 ) [22] supplemented by self-control ( Henderson & Lee, 1992 ) [23] also known as autonomy, and peer- or horizontal control ( Adami, 1999 ) [24] Figure 3 , provides an overview of these five approaches, their key characteristics, and tentative place on a scale from management-centric to employee-centric. One should note that in one organization different approaches can be used in parallel, often related to the type of function ( D'Cruz & Noronha, 2006; Ouchi, 1977; Snell, 1992 ) [25]*

**Behaviour control**
1- structures transformation process of work
2- centralized hierarchy
3- superiors closely monitor and evaluate subordinates actions over time

**Output control**
1- superiors set targets, such as financial results, for subordinates
2- rewards results Achieved
3- only when standards of desirable performance can be defined

**Input control**
1- employee selection and training is used to regulate the knowledge, skills, abilities, values, and motives of employees
2- tries to align goals of individuals with those of the company

**Self-control / autonomy**
1- individuals exercise freedom or autonomy to determine actions required in a particular work situation, and their execution

**Peer control**
1- presence of a work community influences an individuals actions
2- image, interaction, togetherness

Fully by managers          control          fully by employees

**IS/ IT enhancing employee information provision**

**Both technology highlight that IS have the potential to enhance employee empowerment, if organizations choose to use it for that purpose. In some organizations, managers specifically decide not to use this potential because they think it is unnecessary or even undesirable. However, there are also situations in which empowerment would have been enhanced if decision-makers and employees had been aware of the potential and how to realise it. Therefore, other recent developments in IT and IS are explored for their potential to increase or even encourage empowerment. This will expand the focus again to the idea of providing employees with information that enables them to be involved in decisions at different organizational levels, that is beyond how their own tasks fit in with the organizational goals. It is important to realise first, though, that only being provided with information isn't enough to achieve empowerment. Firstly, as mentioned before, employees also need the authority to make or be involved in the decisions. This is a function of organizational design decisions and reflects organizational culture. Secondly, as per the Dikar model ( Dikar stands for data; information; knowledge, action; result, see Ward & Peppard, 2002 and Figure 4 below ) [26] decision-making also requires knowledge. Knowledge can be seen as the interpretation of information by an individual, based on his / her experience, attitudes, values and beliefs ( based on Checkland & Scholes, 1990 ) [27]**
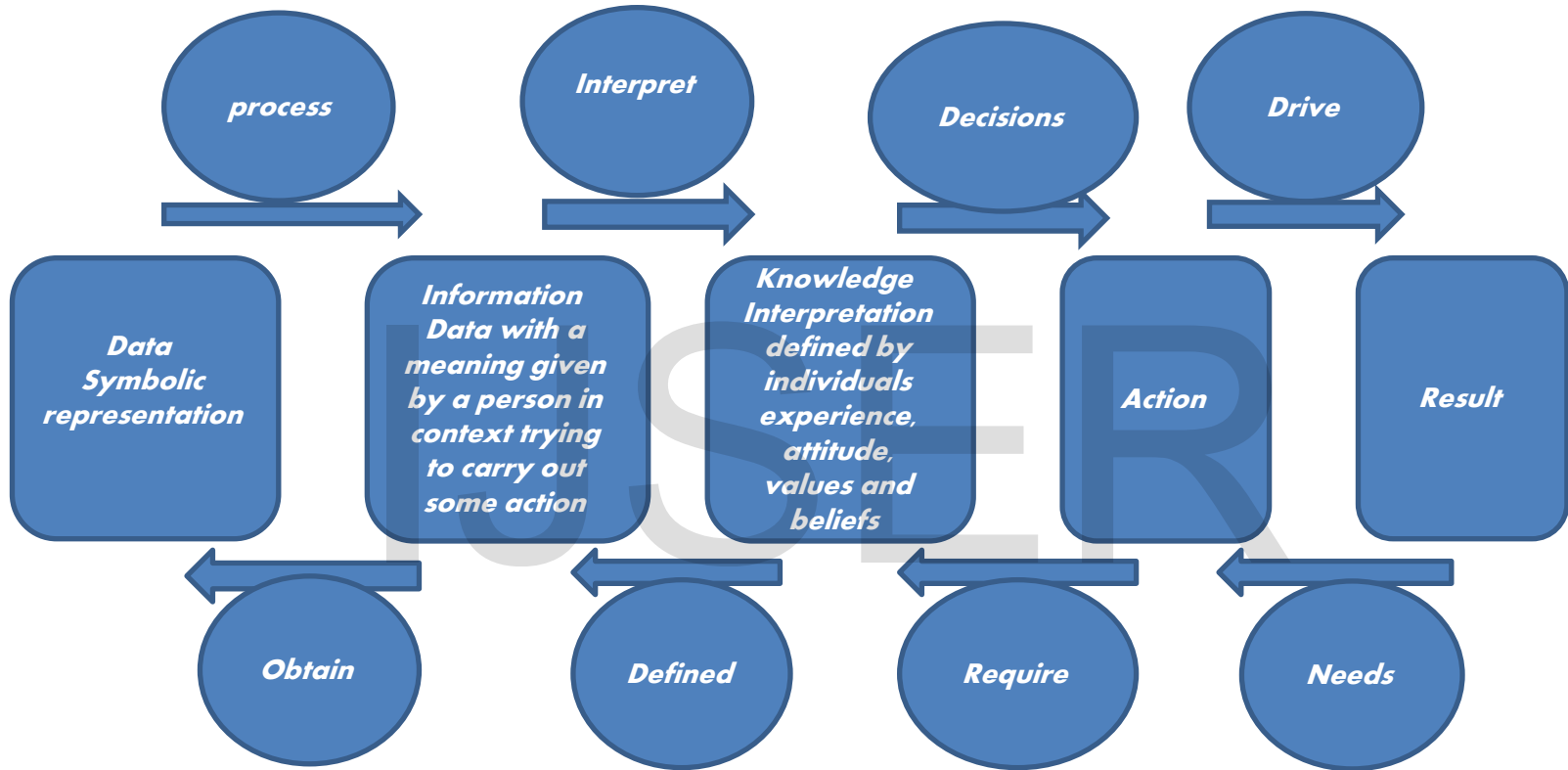
**Figure 4: Dikar model. Source: ward and peppard (2002 ) and Checkland and Scholes ( 1990 ).**

*While date can be stored and manipulated relatively easily using technology, the knowledge that is required for decision-making isn't, despite decades-long attempts to capture knowledge in system. Hence, the importance of people as creators and carriers of knowledge is forcing organizations to realize that knowledge lies less in its databases than its people ( Ward and Peppard, 2002, p. 510 )* [26] *restricting much of the decision-making to a narrow group managers hence also restricts the knowledge base underlying the decisions, as the employees experience and skills aren't included. On the other hand, if decision-making authority of employees is enhanced, they will need to be equipped, not just with information, but also with some specific decision-making skills. With each other, when employees have access to more information, this will also enable them to grow their knowledge, which in itself contributes to further empowerment. Providing too much information, however, could lead to information overload ( a term popularized by Toffler in 1970 )* [28] *where the quality of decision-making is reduced because the decision-maker has more information than he/she can process.*

*All of this puts the role of information in enhancing employee empowerment in perspective, but certainly doesn't diminish its importance. Partly building on the Dikar model, information provision has three key elements.*

*1- creating and capturing data that underlies the information*

*2- creating digestible information, that is contextualized and accessible information in a format that a broad range of people can understand, and*

*3- participation in networks; which benefits communication, information access and information exchange.*

*Creating and capturing data*

**As the Dikar model showed ( Figure 4 ), date is the raw material for information. As the GIGO principle applies there ( garbage in, garbage out, e.g. Turban, Aronson, Liang, & Sharda, 2007 ) [29] accurate, reliable, accessible and timely data is essential for good quality information ( Wang & Strong, 1996 ) [30] Date used to be a bit boring and mundane, but it has gained tremendous attention of late. This is primarily linked to what has been called**

**Big data as well as related developments in Open data.**
**Big data is characterized by three Vs ( Laney, 2001 ) [31]**
**\* volume ( tremendous amounts of data )**
**\* variety ( data in many forms such as normal databases, Facebook, Tweet, etc. )**
**\* velocity ( use of streaming data in real-time, e.g. stock exchange, credit card transaction ).**

**IT enables the creation, capturing, storage and analysis of big data. Open data is the movement where creators⁄ owners of data make the data publicly available. This is done particularly with scientific data ( particularly for publicly funded research ), as well as public sector data. As such it contributes to the volume and variety of big data.**

**The availability of big data as a single set of related data., rather than smaller separate sets, provides organizations with unprecedented possibilities for evidence-based decision-making ( e.g. Pfeffer & Sutton, 2006 )[32] it is, for example, taking a lot of the guess-work out of marketing. If analyzed well, and presented in user-friendly formats ( see below ), it can support employee decision-making, for example, through EPM applications as demonstrated above. There are clearly risks with the use of big data, ranging from the law quality of much of the data ( IBM, for example, adds a fourth V for Veracity to their big data description to reflect this ) to decision-makers hiding behind figures and computers where human judgment and intervention are required ( McAfee & Brynjolfsson, 2012 )[33]**

*However, if used sensibly, big date has, for example, huge potential in medicine, crime prevention and agriculture, not just in marketing and finance. From a social innovation perspective, organizations would benefit from investigating how they can use big data to provide their employees with better information for decision-making.*

### Creating digestible information

*IT is tremendously important in enhancing the user-friendliness of information. Analytical and visualization tools help to analyze large volumes of data and present findings in accessible ways. Because of the increasing use of multiple data sources ( see above ), it is also becoming easier to  setting-context data, for example, showing timelines, comparisons ( with similar elements ), and relative figures. This is supported by an increasing number of publications ( both popular and academic ) on improving decision-makers understanding of information, particularly when visually represented ( see for example the books of Stephen Few, e.g. Few, 2006 ) [34] Here also lies the most important protection against the above-mentioned potential threat of data overload: rather than providing decision-makers with barely processed data, information can be presented in condensed, easily digested forms. This does, however, put pressure on those in charge of creating the systems that provide the information, as a clear understanding is required of what information is needed for particular types of decisions and decision-makers. Developments in IT are contributing here, too, by making it easier for the decision-makers themselves to play around with data and information in order to create views and insight specifically for themselves. This is an empowerment development that takes a lot of the complexity out of developing fine-grained system  for everybody in the organization, by providing individuals with the entire pool of information, and the tools to easily just show the information that is needed for a particular decision. So, on top of a greater supply of data, IT tools provide the ability to make all of the date accessible, leaving it up to the user/ decision-maker to select the bits of information he/she wants.*

## Participation in Networks

Networks are important as ways for employees to access and share information. Clearly there has been a revolution over the past decades in the way organizations and individuals use networks ( i.e. through the internet and mobile networks ). It has affected where and when people work ( e.g. teleworking ), how they maintain contact with friends and colleagues ( e.g. Facebook, Twitter, LinkedIn, email ), how they buy and sell ( eBay, online shopping ), related developments in IT hardware ( particularly mobile equipment such as smart phone and tablet ) has also led to the starting experience that many people have more powerful and up-to-date technology at home than they have at the office. For many organizations this means a need to integrate the personal IT of their employees into the organization platform, a development referred to as BYOD ( bring your own device, e.g. Marshall, 2014 ) [35]

The power of social media, as a subset of networks, lies in the fact that it contain user-generated information that is shared with a network of people, which can be very broad ( e.g. Twitter, LinkedIn ) or narrow ( e.g. restricted to an organization or specific group ). Social media can be classified depending on how much they are about the individual ( self-presentation/ disclosure ) and the richness of the medium.

**social presence / media richness**

| | Law | Medium | High |
|---|---|---|---|
| **Self-presentation / self-disclosure** | High  Blogs<br><br>Low  collaborative projects<br>( e.g. Wikipedia ) | Social Networking Sites<br>( e.g. Facebook Content Communities<br>( e.g. YouTube ) | Virtual social Worlds<br>( e.g. second life )<br>Virtual game Worlds<br>( e.g. world of warcraft ) |

**Table 3 shows the diversity of social media available to employees to support their information provision. For example, they can benefit from the wide range of videos on YouTube explaining various concepts, or find background information on Wikipedia; they can read and write blogs; form groups on Facebook; collaboratively produce content using a Wiki. All of these help to put information from the organization in context, and could provide access to others who can provide further insights and support. This enhances the knowledge-base that is used for decision-making. Networks are also at the heart of virtual and mobile communities of practice ( CoP, see Wenger, 1998 ) [36]**
**By making the supporting technology available to employees. Networks thus provide employees with a wide range of opportunities to gather and share information, and to enhance the knowledge-base they use for their decision-making. This makes them even more attractive as decision-makers in organizations, thus providing a potential drive for social innovation through employee participation.**

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