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Supporting Systems Innovation

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Abstract:

Many researchers and practitioners contend that all organisations respond to changing market need and can create competitive advantage through innovation and creativity. Each year, organisations expend significant resources developing new products and processes and yet research shows that more than half these initiatives fail. Successful organisations are not innovative by accident; they deliberately manage their innovation process. In order to effectively manage the innovation process, organisations must utilise proven approaches to “lever” innovation within the organisation.

This paper proposes a new approach to managing systems innovation that centres on the process of organisational innovation and good management practice. This approach aims to provide a more integrated approach to systems innovation that will make it more systemic and improve its likelihood of success. This papers main objective is to present a Systems Innovation Self-Assessment (SISA) tool. This tool is based on the Systems Innovation Management approach and the findings of a series of case studies of Irish manufacturing industry that were undertaken. This tool allows companies to identify their progress they are regarding Systems Innovation development. A number of observations obtained from these case studies are also presented.

Key Words: Systems Innovation, Levers, Systems Innovation Self-Assessment tool

1. Introduction

In the modern manufacturing environment of global markets and intense competition, organisations constantly face the need to reinvent themselves in response to external forces. Managing organisations in turbulent environments often results in one change initiative being implemented after another. It has become a necessary part of the organisation's life that management must strive to create a periodic “sense of urgency” (Kotter, 1990) to reinvigorate the organisation’s operational methods. To achieve this, many organisations aspire towards one or more management paradigms, such as Total Quality Management, Business Process Reengineering or Lean Manufacturing. No organisation ever perfects such paradigms. Even organisations that set the standards and remain world leaders adopt very different and practical approaches to process change. When observed closely the actual approaches, which organisations use, have much in common. They are practical, individually complex, and surprisingly effective in helping organisations achieve their objectives. In contrast, none of the current paradigms satisfy the total requirements for change management, since they all fail to provide a holistic and practical approach. The unsuitability of the current change paradigms is reflected by the fact that anywhere between 50% to 70% of change projects fail to achieve their targets (Hammer *et al.*, 1995; Burnes, 1996; Tidd *et al.*, 1997). These paradigms do however offer a tremendous amount of knowledge to organisations,- knowledge that can be adopted and used contingent upon an organisations own needs and routines.

Due to the increased need for organisations to change, the process and management of change becomes critical important to an organisation's overall success. This research presents a new approach (called Systems Innovation Management) that reflects the increased emphasis on the management of innovation process within modern industry. A set of five supporting levers, distilled from the rich reservoir of knowledge which existing approaches possess, are presented as part of this approach. A Systems Innovation Self-Assessment (SISA) tool that allows companies assess their progress regarding Systems Innovation Management and where scope for improvement exists. The SISA tool is based on the systems innovation levers and developed based on the findings of eight case studies.

2. Convergence towards Systems Innovation

During the last century, a number of approaches that relate to the domain of organisational change appeared. These range from Scientific Management and Socio-Technical Design to Business Process Reengineering (BPR) and World Class Manufacturing (WCM). The core elements of this myriad of approaches, when combine produce a wealth of knowledge relating to the best practices concerning organisational innovation management. This vast array of knowledge has converged over time, for improved management of organisational change within the current turbulent environment.

The “new” approach to systems innovation comprises a synthesis of the best elements of past approaches, together with a systems perspective that interrelates these elements effectively. The paradigm adopts a contingency approach to innovation by promoting generic elements of past approaches rather than emphasising one best way of operating (Figure 1).

Insert Figure 1 here

An approach to manufacturing innovation management which incorporates a synthesis of current and past approaches, contingent upon the multi-disciplinary needs of the specific organisation, is a perspective which in recent years is gathering support (Tyson (1997), Tidd *et al* (1997), Price Waterhouse (1996)). Eccles (1992) when discussing the deluge of “new” approaches that appear in modern literature, highlights the risk of fanatically supporting “new” approaches and as a result misunderstanding and neglecting the lessons available from past approaches. Burke (1987) emphasises the value of a contingency-based approach to organisational innovation and stresses that “there is no one single, all encompassing theory... What we have are a number of mini-theories that help us understand certain aspects of organisational behaviour. Taken together and comparatively, they become useful”.

This “new” approach is based on addressing the holistic requirements for managing of innovation. The approach is developed upon five broad enablers, which act as “catch-

alls” to incorporate the vast array of positive elements, distilled from the existing approaches. These five pillars not only provide a firm foundation on which the new approach is founded, but also support the development of the innovation process within organisations. These are (1) Organisation & Leadership; (2) Strategy & Performance; (3) Empowerment & Groups; (4) Reengineering and Improvement and finally; (5) Learning and Communications.

3. Identifying the Levers of Systems Innovation

As stated above, a number of common traits or enablers are grouped into five systems innovation levers. From our research, we have identified these levers, which positively contribute to the organisations' efforts to manage their systems innovation (Figure 2). These levers facilitate the innovation process and ensure an organisational environment in which systems innovation can flourish.

Insert Figure 2 here

3.1 Organisation & Leadership

The first lever encompasses ‘organisation and leadership’ theory; elements that have proven instrumental in the success or failure of numerous organisational change efforts in the past. The importance of leadership with respect to innovation is highlighted across a spectrum of change approaches such as BPR and WCM. Senior management must be committed and willing to champion change initiative in order to emphasise its importance and reduce employee resistance (Bashein *et al.* (1994), Belmonte *et al.* (1993)). Hammer *et al.* (1995) state that “if your leadership is nominal rather than serious and isn’t prepared to make the required commitment, then your [BPR] effort is doomed to failure”. Quinn *et al.* (1997) view leadership as “the most critical single role stimulating innovation.”. Kotter (1990) notes that leadership is a process, whose purpose is to “help direct and mobilise people and/or their ideas”. Thus the leadership style must provide direction for the organisation and allow the employees to feel that they contribute to the development of the future organisation.

Rothwell (1992), when discussing the critical factors for success, emphasises the importance of the “presence of key individuals... [such as] product champions and technological gatekeepers” and “the top-management commitment to and visible support for innovation”. Through operating as a management team, a consensus based approach to determining the direction of the organisation can be obtained. A group leadership approach allows the adoption of a more holistic perspective of the effects of change. In addition, the senior management team can develop a consensus reaching management style that reduces resistance both internal within the management team and also between the organisations' different layers. A consensus-based approach helps avoid differing signals passing down the chain of command by different managers. The management layer operating as a team must be highly visible in the innovation process in order to “lead by example” and encourage participation and group working by an organisation's lower layers.

This lever also incorporates the issue of the organisational structure. The choice of structure adopted has a large impact on an organisation's ability to innovate internally. A flat, networked structure that facilitates communication and encourages cross functional group operations represents the most advantageous style. Burke (1987), following a synthesis of three leading authors in organisational development states that the optimum structure for modern organisations is “less hierarchical... and networked more”. Burns *et al.* (1961) promote an “open, horizontal management style” to be adopted in organisations and West *et al.* (1990) supported the belief that a “democratic, collaborative style” is most suitable for encouraging innovation. While it is beneficial for ultimate responsibility to rest with one individual since this avoids “buck-passing”, such an individualistic approach does not avail of teamwork advantages (Katzenbach *et al.*, 1993). Champy *et al.* (1996), when discussing the advantages of “adaptive networks” state that labour is “not divided but rather shared among knowledge workers, who may either act as individual contributors or as part of a team”. Thus, it is important that management demonstrate leadership and to encourage personnel to operate effectively as teams.

3.2 Strategy and Performance

Strategy and performance is the second lever identified for facilitating systems innovation. Pascale *et al.* (1981) include ‘strategy’ and ‘super-ordinate goals’ as two of their “seven-S’s” approach to innovation. West *et al* (1990) cite Meyer’s (1982) findings that “... ideology and strategies exert strong forces guiding organisational adaption”. The presence of an effective strategic plan can “act like a beacon to guide the organisation during the turmoil of the change process” (Dooley, 1997). An effective strategic plan is a concise document that clearly defines the strategies pursued by the organisation and the desired vision. This plan should be readily accessible to all the organisations employees so that they can correlate their idea generation and problem solving activities to the current goals. Such transparency obtains a better correlation between goals and systemic efforts to develop the organisation.

A key aspect in identifying future goals is understanding the organisation's requirements. This research defines four broad categories of requirements: customer, conformance, corporate and critical internal factors. In the context of an operations company, customer requirements articulate what the customer wants in terms of timeliness, quality and cost. Corporate requirements identify specific critical success factors at a business level that the company must maintained or improved. Conformance requirements identify what standards or regulations the company must implement as a matter of necessity rather than strategy. Finally, the critical internal factors are specific factors for the company at a operations unit level that must be maintained or improved.

One of the main findings of the AMBITE project (BE 7049) highlights the benefits of a framework that allows the translation of business goals into a set of operational level performance measures. The identification of these measures provides a means of aligning ongoing actions with the goals. Bradley (1996) identifies five main macro measures of performance within the manufacturing model. These are time, cost, quality, flexibility and the environment. The identification of supporting measures allows for a continual monitoring of the organisations’ efforts to achieve its goals. Neely *et al.* (1995) emphasise the need for an organisation seeking advancement to have “a set of metrics used to quantify both the efficiency and effectiveness of actions”. While the strategies

and performance measures define the path for organisational development, projects and incremental improvements/ quickwins are the modes by which they are achieved. Thus a strong correlation must be maintained between a company's current goals and the actions underway to achieve these ends.

3.3 Empowerment and Groups

Empowerment and groups is the third lever of Systems Innovation. This lever strives to involve all the organisational layers in the innovation process and is rooted in developments such as human resources movement, socio-technical design (Pava, 1983) and the psychology and operation of groups (Lewin, 1958). In order to facilitate the spread of systems innovation throughout the entire organisation, it must expand from the sole domain of senior management. While it is necessary for management to decide on the strategic path and to lead by example, they must also engage their employees in activities that positively contribute to the development of innovations. Pascale *et al.* (1981) highlight the importance of this when they include 'Staff' as one of the "seven-S's" approach to innovation. One of the core concepts of systems innovation is that innovation would be systemic in nature; this is that everyone in the organisation continuously contributes to the innovation effort rather than a chosen few designers. This allows the organisation to generate as many ideas for potential improvements as possible for the innovation process. Davenport (1993) stresses that "if process innovation is to succeed, the human side of change cannot be left to manage itself".

The use of workgroups across functional boundaries allows the attainment of a holistic view of problems to be attained. Better communication is achieved and resistance to change reduced (Mabey *et al.*, 1993) through ensuring that group make-up is both horizontally and vertically integrated. The organisation also avails of many other benefits of teams discussed by Katzenback *et al.* (1993), as well as fulfilling many of the social needs of its employees (Maslow, 1954). Martin (1995) states that "the use of true teams is greatly underexploited in most of today's enterprises". Empowerment is more than just delegating work to subordinates; it also ensures that these individuals possess the autonomy and authority to make necessary decisions to achieve their tasks. It requires

more democratic and collaborative management (West *et al.*, 1990) that view their subordinates from a 'theory Y' perspective, rather than that of 'theory X' (McGregor, 1960).

By ensuring that employees may contribute to the innovation process, allows employees can fulfil certain esteem and self-actualisation needs (Maslow, 1954). Employee rewards can maintain motivation with regard to innovating the organisation's systems. Reward and training systems ensure employee motivation by the increased prospects of a meaningful future, advancement and higher compensation. The core findings of Smyth's (1997) work on sustaining WCM was that organisational support systems must be altered to support ongoing change initiatives. This draws on the expectancy theory (Vroom, 1964) for ensuring that satisfactory portions of gains made by the organisation pass to employees. One clear metric of employee motivation and job satisfaction is the company's staff turnover and worker absentee rate. A high rate in either highlights dissatisfaction and a lack of willingness for employees to view themselves as stakeholders in the organisation. Davenport (1993) stresses that "approaches such as greater empowerment, reliance on autonomous teams and flattened organisation are as key to enabling process change as any technical tool".

4.4 Reengineering and Improvement

The fourth lever identified is reengineering and improvement. It addresses two distinct types of change in an organisation; radical \ step change and incremental \ quickwin change. The lever recognises that organisations' efforts to innovate will include periods of radical change and incremental change on a more continuous basis and that both occur in parallel. The competing paradigms of WCM and BPR sometimes create the impression that both types of change are mutually exclusive. The reality however is that companies constantly expend resources developing themselves utilising both types of change initiatives. The benefits of both type of change have been well debated in the past (Schonberger (1982), Juran (1993), Parker (1993), Ould (1995)). Hammer (1990) believes that change effort "should strive to break away from old rules.. the notion of discontinuous thinking", while Keegan (1997) states that through "continuous improvement... and by amassing a large number of them [will] achieve significant

improvements in overall performance”. Hall (1997) supports this need for dual rates of change as a necessary means of avoiding the organisation “cooling down” and loss of momentum with respect to innovation. Parker (1993), when discussing reengineering, describes it as “an explosive mix to make dramatic change.... Which builds of existing change processing mechanisms (which are incremental in nature)”.

At any point in time, an organisations’ development portfolio will have actions coming to a close, others in progress, some starting and a plethora of actions in development awaiting approval. Innovative actions arise from the problems and ideas that are harvested from the various organisational stakeholders. The senior management team constantly motivate stakeholders to develop the processes. This can occur through customer complaints, corrective action systems, suggestion boxes and brainstorming sessions. As with any change, there is a need to understand the design and operation of the existing systems, prior to modifying them. To this end, the use of high level modelling techniques helps communicate how processes currently are and to present a picture of how these processes will operate in the future. A common problem faced by organisations is that they become confined by the internal ways of thinking and as a result produce ‘standardised’ ideas and solutions. The use of techniques such as benchmarking and external consultants offer a means of ‘thinking outside the box’ (Andersen, 1995) and ensures the development of both radical and incremental action. The transition process from an initial idea or problem definition to the eventual implementation of the action must be clearly understood within the organisation. This often occurs through the defining of the ‘stage-gates’ (Cooper, 1988) that the actions must pass to be approved and implemented. The use of minimal critical specifications (Pava, 1983) for compiling and monitoring the essential details of actions is effective to this end. Organisational resources for process innovation are limited, so only a proportion of actions that are developed will be implemented. In order to maximise the benefit to the organisation, a system of ranking should be undertaken to align approved actions with the organisation's goals and constraints.

4.5 Learning and Communications

The final lever identified is learning and communication. This lever is strongly interrelated to all other levers, but is essential to the support of empowerment and groups. Learning and education are essential elements to ensure human resource development and company success (Senge, 1990). Rothwell (1992) includes the “use of effective communication to gain a consensus for change” as part of his “ten-C’s”. The opportunity to learn can be used as a motivation reward for an employee accepting increased responsibility. Such an approach to employee reward is mutually beneficial, since the employees’ future value is increased through knowledge and experience. The organisation gains through employees applying this newly acquired knowledge in their daily operations. It is important that organisational recruitment focuses on developing a learning environment. Through continuous education and effective training plans, the organisational skills base grows and fills gaps that exist in the versatility chart (Amabile, 1996). In organisations that are at the leading edge of systems innovation, both management and employee level undertake training courses to improve effectiveness. Weisbord (1987) emphasises the importance that “everybody has a chance to learn, grow and achieve” to develop a greater degree of self-control and innovation within the organisation.

The second part of this lever is that of communication; this aspect is an integral part of each of the other levers discussed previously. Communication is highlighted as an important tool in overcoming resistance to change. The organisation reduces resistance through the development of a culture where people know that they are viewed as ‘stakeholders’ and have their input into the decision making process. Davenport (1993) includes communication as one of the key enablers for process change. An atmosphere of trust and empowerment can be developed through communication and open access to information regarding the innovation process. Such transparency encourages people to continuously engage in the process, as the necessary information is accessible to track their proposals. Communication is also essential for organisational goals to be more than mere documents. The organisational goals must be disseminated through the organisation's layers, so that it becomes a ‘living document that impacts on everything that the company does’ (Dooley, 1997). Thus employees can refine their ideas to better

align with the organisational goals prior to submitting them to the innovation process. Kotter (1995) states that “in the more successful transformation efforts, executives use all existing communication channels to broadcast their vision... [and] that communication comes in both words and deeds, and the latter are often the most powerful form”.

From the above, it becomes clear that these five levers, not only support the Systems Innovation Management process, but are mutually supportive also. This interrelationship strengthens the entire approach since it presents a consistent approach towards systems innovation management. The levers discussed above are a synthesis of organisation and process development best practice and embody the traits that support management of the innovation process.

4. The Process of Systems Innovation

As mentioned earlier, the success or failure of individual organisations to innovate itself depends on organisations' own processes that the particular firm learns through the experience of time. While popularist approaches such as BPR or TQM can generate ideas and motivation and the levers can support the operation of the process, it is the process itself that determines the organisations' ultimate success or failure to effect change. The pattern for success is increasingly favouring organisations who develop innovation processes that adequately manage the knowledge and technological skills available within organisations and the external environment. One representation of such a process for the management and co-ordination of manufacturing innovation is the “Development Funnel” (Hayes *et al.* (1988), O’Sullivan *et al.* (1998)). This approach used the metaphor of a funnel to represent organisations attempts “to reconcile and integrate competing projects” generated by their ongoing efforts to improve and develop (Price Waterhouse, 1996). Tidd *et al* (1997) also use the metaphor of a funnel as part of the “routines underlying the process of innovation management”. The Systems Development Funnel presents a more detailed picture of how the interrelationship of the innovation process is managed and co-ordinated (See Figure 3).

Insert Figure 3 here

The Systems Development Funnel views the innovation process operating as follows. Prospective innovation projects are generated from various sources and enter the development funnel through the mouth. As they progress into the funnel's mouth, factors such as 'strategy', 'resources' and 'corporate objectives' constrict them. The effect of these goals and constraints results in a number of activities occurring to prospective innovations. They are rejected, merged together, altered in some manner, allowed to continue on through the funnel unchanged or assigned to incremental change for immediate implementation. The decision as to whether a prospective innovation is assigned to incremental innovation or is allowed to continue on through the systems development funnel to be further developed is decided by the management team. The funnel's converging walls represent how the systems innovation process correlates the organisation's strategic direction and the development portfolio of actions it has underway at any one time. Any action that passes through the funnel is "tempered" relative to these goals and constraints. Actions that pass through the funnel become part of the Systems Innovation Plan. The current absence of such a process in many organisations is highlighted by Price-Waterhouse (1996) who state that "many managers are faced with an undisciplined collection of change projects that together make little sense and ... don't reveal a rational pattern or integration of objectives"

Innovation projects that progress to the systems innovation plan are correlated and refined in accordance with the organisation's goals and constraints. Each action is defined to its "minimum critical specification", which provides management with adequate information to make their decision as whether to approve the project or not. If the action is approved, then it can be specified in fuller detail if the Project Manager deems it necessary. Each of the actions in the Systems Innovation plan are ranked in order of preference and submitted for allocation of the annual budget. Actions that receive approval from the annual budget, are implemented in accordance with the project management routines of the organisation. This involves the implementation and ongoing evaluation of individual actions relative to specific targets. The final step in the Systems Innovation process is a feedback loop that enables an organisation to learn from the experience that it has gained undertaking the action. This compiling of the organisations "traumas and triumphs as a sort of corporate consciousness" assists in the future development of the organisation

since it enables learning from their mistakes (Tyson, 1997). While this model of the innovation process is but one representation, it addresses the interrelationship of the different factors that impact an organisation's ability to manage its innovation process. The benefit of this approach to the innovation process is that it helps align actions pursued by the organisation with existing goals and constraints.

5. Development of the Systems Innovation Self-Assessment tool

As defined in the introduction, this paper's primary aim of the introduction of the Systems Innovation Self-Assessment (SISA) tool that allows organisations evaluate their progress regarding Systems Innovation and identify scope for improvement. A dual approach, undertaken in parallel was adopted to the development of the SISA tool. Firstly a set of criteria were developed around the five Systems Innovation levers. These criteria were derived from a synthesis of best practice from literature, published research and the experiences of innovative organisations. At the same time a series of qualitative, semi-structured interviews were undertaken of eight manufacturing organisations. The aim of these surveys was to ascertain where and how these organisations focused their innovative efforts. The survey permitted assessment of how the SIM research correlated with the practical industrial efforts. The organisation's feedback showed a strong correlation with the Systems Innovation levers, identified by the independent research. The survey findings were also used to refine the SISA tool criteria. These criteria are specific statements that detailed potential implementations of the systems innovation levers within industry. Using the refined SISA tool, each of the organisations surveyed was evaluated to determine their potential for systems innovation. The accuracy of this data, while highly subjective, demonstrates the tool's effectiveness at identifying areas where scope exists for further innovations. An overview of the methodology applied to the development of this tool is presented in Figure 4. Table 1 gives a list of criteria that form the basis of the SISA tool. Some criteria included in this list may be viewed as 'trendy', while others may appear to be 'just good common sense'. However, irrespective of the relative age of the criteria, they are all practical ways in which the organisation can realise the levers of Systems Innovation and facilitate their innovation process.

Insert Figure 4 here

The SISA tool functions by organisations awarding itself a score relative to each of the criteria listed in table 1. This ranking scale ranges from 1 to 5. An organisation that feels their systems “strongly disagree” with a specific criteria award themselves a score of 1, while an organisation that feels their systems “strongly agree” with the criteria award themselves a score of 5. A total score is calculated for the 50 criteria and a separate average score for each of the five sub-heading (representing each of the levers). The total score is then multiplied by a factor of 4, to give a maximum score of 1000. This simplifies differentiation between good and bad organisations. The score that the organisation awards itself highlights their compatibility with respect to systems innovation. The hypothesis is that an organisation that scores high possesses a good fit between its systems and the criteria, allowing them supporting systems innovation. Inversely, an organisation that scores lowly does not possess suitable systems and will experience more difficulty supporting innovation. Taking an average score for each of the individual sub-headings scores, allows the organisation see where it is doing well and where they have scope for improvement. The plotting these values on a ‘spider diagram’ highlights the point more dramatically (Figure 5). The SISA tool allows the organisation compare their most recent score, with past assessments or the results off other companies, to evaluate their ability to support systems innovation. A table outlining the results achieved by the eight firms who participated in this research is presented in table 2. The identity of the individual firms was removed for confidentiality reasons. The next section of this paper presents this analysis.

Insert Table 1 here

6. Case Study Analysis

A series of indepth, semi-structured interviews were undertaken to analyse the degree to which the organisational innovation processes correlated with that envisioned by research. The information gathered in these interviews provides input into the SISA tool's development, as well as a case study for testing the operation of the tool. The

survey sample was selective, based on Irish organisations, with which the researchers had past experience. The survey involved visiting eight manufacturing companies and interviewing members of their management team. The interviews focused on individual innovation processes and the aspects that interviewees felt contribute most to encouraging innovation. The organisations selected covered a cross section of industry, ranging from healthcare to computing, from pharmaceuticals to telecommunications. The size of the organisations varied from 150 to 1,500 employees. All eight organisations surveyed were multinationals, with only one of these having their world headquarters in Ireland. Following analysis of the interviews, the researchers drew a number of general conclusions as to factors that facilitate systems innovation within organisations.

The consensus across the organisations highlighted the need for continuous change and that the rate of this transition must vary depending on the external environment's turbulence. As a result, many organisations possessed an organisation development portfolio of projects consisting of incremental improvements and larger initiatives that require substantial resources. Many of the organisations' management had informal processes that helped correlate individual initiatives of this portfolio with their unique priorities. One of the major difficulties highlighted by management in controlling the process of innovation was ensuring the continued motivation of the organisation regarding the need for change, while approving actions that are aligned with organisational goals.

Empowerment, participation and autonomy all played a large part in the innovative efforts of the organisations surveyed. Project groups were essentially cross-functional in composition with participation from different levels of the organisation. A high level of autonomy and discretion was allowed to both individual staff members and employees on the shop floor. Efforts were made to ensure that employees work offered a variety of tasks, together with the scope for the continuous exchange of help and ideas to feel part of a team. The tendency of the organisations was movement towards a culture that supported organisational learning.

Employee contribution to the innovation process was widespread and the organisations demonstrated a high proficiency in both exploiting ideas and actively engaging in problem solving. Most organisations had some form of performance rewards system linked to idea generation. While this has proven successful in the majority of organisations, some organisations also highlighted that it had proven to be a source of potential conflict at an employee or department level. Management stressed that regardless of how the incentive scheme operated, it was important to ensure that employees share in any improved productivity and to be viewed as organisational stakeholders. Recognition of involvement primarily manifested itself through the provision of increased opportunities to learn or through financial rewards. All the organisations surveyed viewed their employees as valuable assets and hence there was a tendency for low levels of staff turnover.

Finally, these organisations believed very strongly in open communication and viewing everyone as part of the same team. There is a constant flow of information regarding all aspects of the innovation process so as to encourage maximum engagement of employees. The channels of communication used included newsletters, bulletin boards, email, management meetings and quarterly.

As mentioned earlier, the refined SISA tool was applied to each of the organisations surveyed, in order to demonstrate its operation. The results of these assessments are presented in table 2.

Insert Table 2 here

While the overall analysis of the sample organisations highlighted support for the criteria listed in Table 1, the data in Table 2 highlights that individual organisations had varying strengths across the different levers. Figure 5 illustrates the SISA tool results for Organisation B and Organisation H. From the analysis, it is clear that both organisations are strong in the lever of ‘Learning and Communication’. Organisation H also scores high in the other sectors. We can see that organisation B however has large scope for improvement in the other four sectors. The self-assessment tool identifies Organisation

B's weakness relative to Organisation H for facilitating innovation. Through ongoing audits, the SISA tool offers an organisation a means of tracking its progress towards systems innovation. Organisation B's poor results are attributable to the fact that it is currently preparing for a major restructuring initiative. Its high scores in the category of 'communication and learning' is a result of the initial work of their restructuring effort. The General Manager of Organisation B stressed that he was aware of his firm's weaknesses and had initiated the restructuring drive to address them.

Insert Figure 5 here

7. Conclusions

Modern organisations cannot survive without constant innovation. In order for an organisation to ensure its innovation efforts are successful, it must carefully manage its innovation process. Companies are often required to make difficult decisions about which innovations to implement and how to allocate scarce resources. In order to make these decisions, effective and proactive strategic choices must be made. This requires a deep insight into the organisations capabilities and potential. Innovative capabilities can be defined as the comprehensive set of characteristics of an organisation that facilitate, enable and support innovation strategies. Organisations may conduct evaluation audits to help assess their capabilities and to identify potential opportunities for the future.

This paper introduces a new approach for the innovation of an organisations' systems, together with five supporting levers. The main focus of the paper is the development of a self-assessment tool based on the five levers. The aim of this tool is to permit organisations better understand and manage their innovation process. The SISA tool also allows identifies the organisations' strengths and weaknesses relative to systems innovation.

The case studies undertaken analysed the reality of the organisational innovation process and revealed that innovative organisations demonstrate a number of common traits. These organisations have a focused vision and are aware of where they are going and

know how they are going to get there. The employees of these organisations are committed to achieving of these common goals. Cross-functional teams are effective mechanisms to realise this goal. All organisations have a continuous desire to develop and the level of this success is measured through feedback systems and review mechanisms. Innovative organisations are aware of its key operational measures and constantly articulate these through the deployment of consistent objectives, strategies and performance measures.

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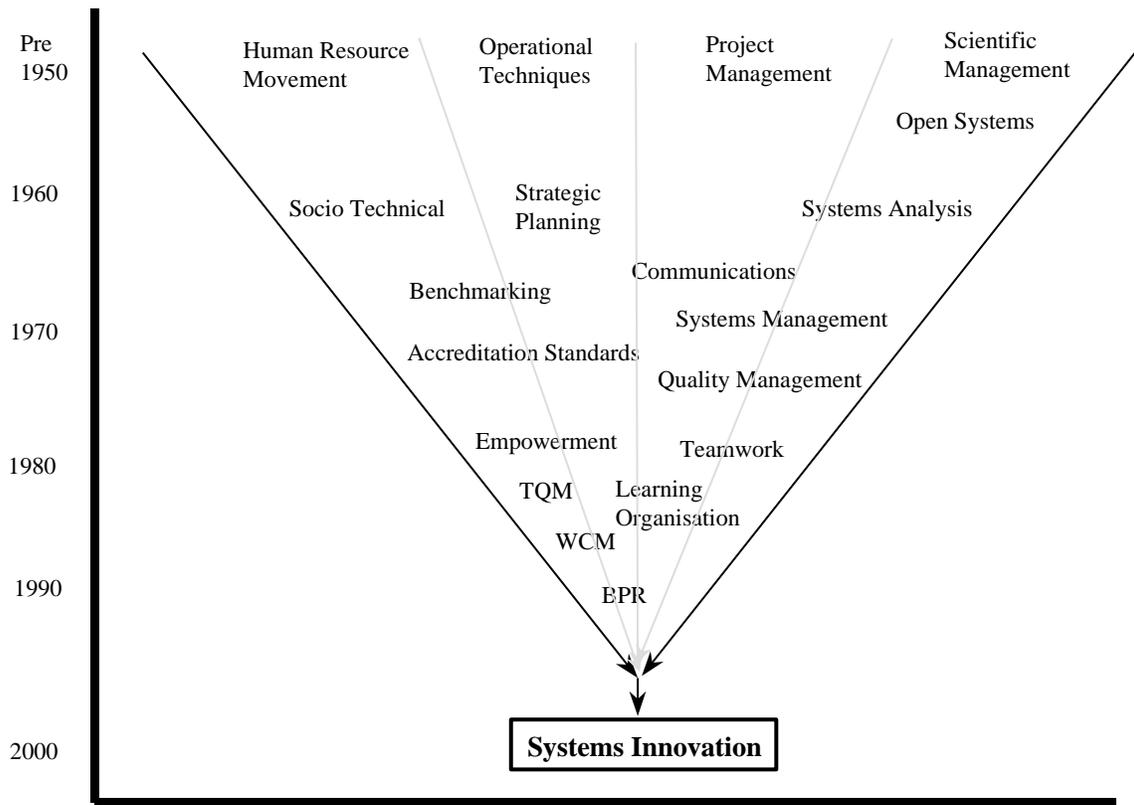


Figure 1: Evolution of Systems Innovation

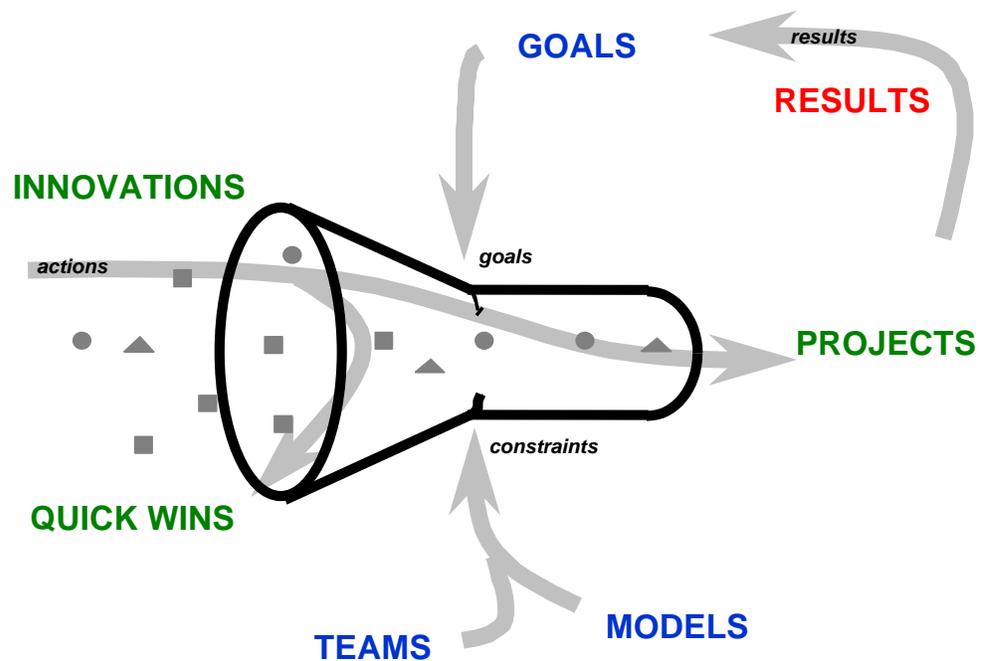


Figure 3: The Systems Development Funnel

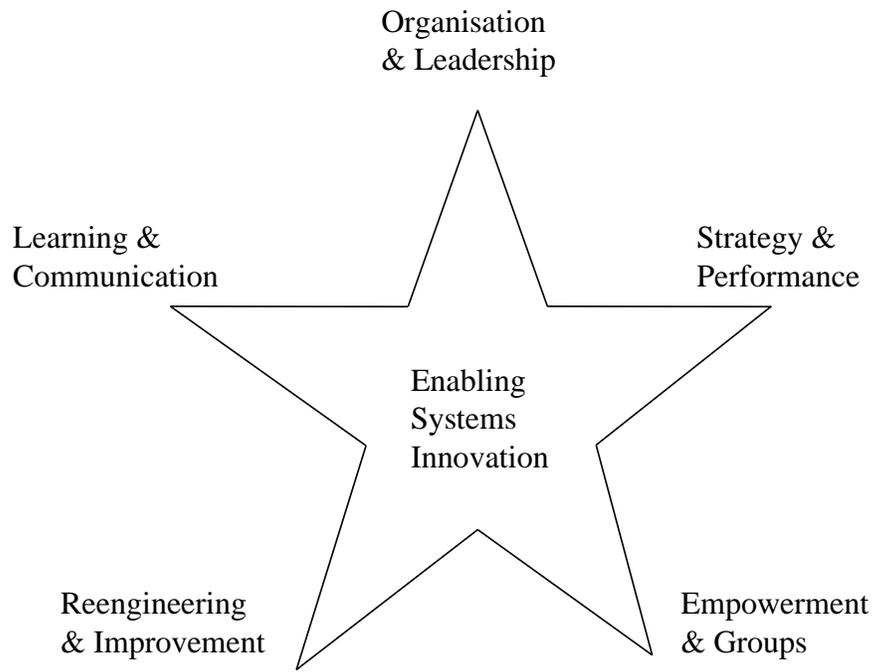


Figure 2: The Systems Innovation Star

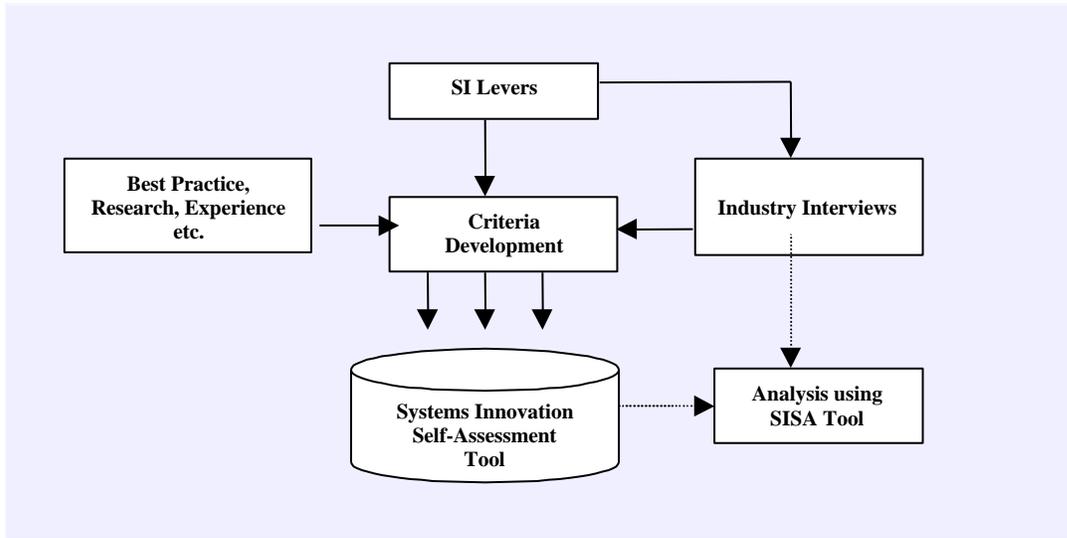


Figure 4: Methodology for the development of SISA tool

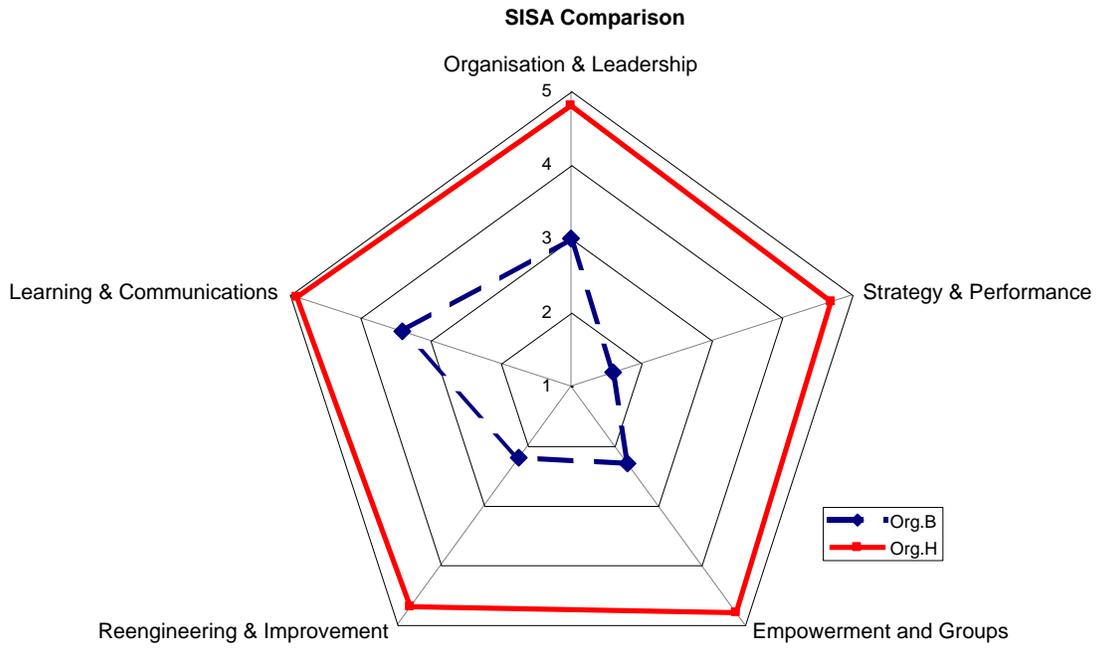


Figure 5: Comparison of SISA results

Organisation & Leadership

- The organisational structure supports group-based management.
- The organisational structure is networked and adapts well to changes in the business environment.
- Management encourages individual staff / groups to take risks.
- Various levels in the organisation have input into the decision making process.
- The management style supports the goals and strategies pursued by the organisation.
- The management adopts a consensus and shared approach to decision making.
- Senior management communicates the same vision and goals.
- Management are effective at initiating and driving innovative change.
- Management are proactive (rather than reactive) about change.
- Senior management are highly visible in driving innovation.

Strategy & Performance

- The strategic plan or informal management strategy for change is effective.
- All employees have access to the strategic plan (if written down or verbally communicated).
- The process for creating and reviewing organisational strategy is effective.
- The correlation between organisational goals and current developments is high.
- All staff in the organisation participate in strategy formulation.
- Benchmarking is carried out as part of the process of deriving organisational goals and strategies.
- Current measures of performance are effective towards fostering change.
- The strategies and measures of performance are regularly communicated to staff.
- There is a good fit between measures of performance and current developments.
- The strategies and performance measures adapt to reflect emergent changes in the business environment.

Empowerment & Groups

- Shop floor employees and office staff engage in workgroup activity.
- Project groups are cross-functional based and represents a diagonal slice of the organisation.
- New ideas and problems are easily harvested from all employees.
- A high level of autonomy and discretion is allowed to individual employees.
- There is delegation between senior and junior staff members.
- Employees work offers the optimal variety of tasks.
- Employees have the opportunity to exchange help and respect among fellow employees.
- Employees have a sense of meaningful contribution to the innovation process.
- Employees have the prospect of a meaningful future, advancement and higher compensation.
- Employees share in the improved productivity of the organisation.

Reengineering & Improvement

- The organisation has an appropriate balance between transformational and “Quick-Win” change projects.
- The organisation has new projects starting and old ones finishing on an ongoing basis.
- There is an appropriate balance between proactive and reactive developments.
- There is appropriate use of modelling and planning tools for projects and resources.
- The organisation uses external change agents (consultants, etc.) appropriately.
- Management encourages 'thinking outside the box'.
- A sense of urgency is maintained towards “on-going” innovation
- Critical information regarding ideas, problems and projects is readily available to facilitate the decision making process.
- Both the incremental improvement process and the innovation management process are effective.
- The organisation effectively ranks the individual developments contribution to the achievement of its current goals.

Learning & Communications

- Employees have the opportunity to learn and continue learning on the job.
- The training process for staff is effective.
- The management development process is effective.
- The staff review and reward process is effective.
- The recruitment process is effective.
- There is low turnover among office staff.
- Difficult change is openly discussed and accepted.
- Information on problems raised, ideas generated and project status is accessible.
- Information on strategies, measures of performance and customer requirements are accessible.
- Information concerning the decisions taken by management regarding the entire innovation process is accessible.

Table 1: Criteria of the SISA Tool

Levers	Org. A	Org. B	Org. C	Org. D	Org. E	Org. F	Org. G	Org. H
Organisation & Group Leadership	3.0	3.0	2.9	2.8	3.4	2.3	2.5	4.8
Strategy & Performance	2.1	1.6	4.1	3.7	3.7	2.4	3.2	4.7
Empowerment & Groups	3.3	2.3	4	2.5	4.0	4.3	1.2	4.8
Reengineering & Improvement	2.3	2.2	3.5	2.0	3.4	2.3	3.3	4.7
Learning & Communication	4.0	3.4	3.7	2.8	4.4	4.1	3.5	4.9
Organisational Score	588	300	728	552	756	616	548	956

Table 2: SISA Tool Results