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INFORMATION TECHNOLOGY ENABLED BUSINESS PROCESS RE-ENGINEERING: THE RIGHT STARTUP FOR EFFECTIVE KNOWLEDGE MANAGEMENT SYSTEM

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Abstract: Increased realization of better knowledge management will inevitably create value to a firm, by which other partners of the value chain and the ultimate customers will be benefit. A first mover firm or value-chain with the capability of creating unique value is being considered as a core competence of maintaining continual sustainability against market challenges. Believing the fact, many firms are using IT enabled Knowledge Management (KM) for shearing information with the customers and suppliers. Although some firms are experiencing benefit from introducing need focused information system (IS), a considerable number of business units suffered huge financial investment without desired result or no result at all. As a consequence of these bitter experiences, advantages of IT enabled KM are being ignored and firm or firm's value chain are being deprived from In-Time value delivery. So rightly spirited company must tailor it's IT enabled KM system in order to achieving desired result as expected before start.

Key wards: Restructuring, competitive advantage, information technology, BPR, KMS

Introduction

Restructuring, rationalizing, downsizing are common phenomena that becomes increasingly prevalent in the contemporary information economy. Increased customer demands are forcing companies to look for continual development of the prevailing business processes in order to increasing sustainability in the market. Strategic managers are under pressure to examine basics assumptions of how work should be performed. By questioning standard processes and traditional practices, often they come up with a solution of 'right thing to do' instead of 'do the right thing'. Radical transformation of business processes have created a unique scope of implementing firms' strategic objectives.

In the new era of e-economy, nature of shift of the business environment is more of a discontinued development than incremental. Under the nearly unpredictable environment, smooth transfer of knowledge for competitive value generation is inexorable. Information Technology plays a catalytic role in this transformation process (e.g. journey towards generating competitive advantage that starts from the data collection from the external as well as internal business environment and ended up with the creation of value for the customers). (Fielder, 1994) says 'the use of IT might be as simple as automating payroll, or as radical as enabling the establishment of a just-in-time inventory system as part of strategic thrust to redesign how work is carried out with customers and suppliers'. But IT alone can not perform all the jobs. In order to streamlining knowledge transfer into competitive advantages and to stay on the top of the customer demand, dynamic business firms need to consider fundamental re-thinking on prevailing standard process. Processes are believed perfect to remain competitive as per understanding of the previous challenges but are being apprehended insufficient due to discontinuous development that derives from the competitors' innovation, which in turn may develop a sustainable Knowledge Management System (KMS).

The objective of this paper is to flesh out a model that will enable business leaders to give due consideration on every allied business areas for sustainable KMS. Model emphasizes on their inter-dependence and inter-relationship on identified elements and considering that any uneven weight on those elements may be the cause of undesirable result.

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In order to develop the model, we have described business process re-engineering (BPR) and business benefit, role of information technology in BPR success and value oriented KMS in the following paragraphs.

Business Process Re-engineering and Business Benefits

In the face of discontinued development in the business environment, progressive decision makers need to consider dramatic improvement in performance development through radical change in practices in collaboration with continual sensing system. In the process of learning, unlearning, and relearning from the environmental reality, principals of continual development and empowerment of Total Quality Management (TQM) are quite helpful for better sensing ability. TQM principle of 'bottom-up participation' is in turn help BPR principle of 'putting the decision point where the work is performed.' The change of top managements' intent towards business strategy development is not a one-off action and practice. As the opportunities and threats are developing in the environment, different strategic areas of business need to be adjusted and re-adjusted to cope with those challenges. Continual sensing ability enables strategic managers to focus on right re-engineering. To create dynamic knowledge asset by using progressive KMS, a drastic and radical changeover in the existing system of operation is needed, where the concept of BPR is useful. Once things has been adjusted or re-adjusted according to the shift of the environment, a continual improvement system needed for understanding the changes over a period of time is desirable because of the volatile nature of e-economy. In this part, we have given some description of BPR for better understanding.

The term Business Process Re-engineering (BPR) can be explained in a way that bring deliberately fundamental change in the critical business processes with a view to improving efficiency in the management of cost, quality and time. Processes are presumed as an obsolete practice in face of challenges that derived form competitors' action and obsolescence of a process occur due to its inability to create comparative advantages. It helps to jump from the one level of standard to the new and dynamic one. (Stewart, 1993) comments 'reengineering is the radical redesign of business processes to achieve major gains in cost, service, or time'. Stewart further mentioned that BPR typically contains eight dynamic characteristics. These are-

- It attempts to achieve dramatic improvement in performance;
- It involves radical departure form existing practices;
- Is usually enable by IT;
- It is a deliberate and planned endeavor;
- It brings flat organizational structure with cross-functional work teams overturning; bureaucratic hierarch;
- It is an planned action to outperform competitor;
- It tents to implement new information and measurement system; and,
- It introduce on new value system (culture) with greater emphasis on customer.

Business process is a set of actions of sequentially aliened functions undertaken for chasing a desired outcome. Davenport & Short (1990) defines business process as "a set of logically related tasks performed to achieve a defined business outcome." They mentioned three dimensions of process:

Entity: process takes place between organizational entities. It could be inter-organizational (e.g. Electronic Data Interchange (EDI) in manufacturing and SWIFT financial organization respectively), inter-functional or interpersonal.

Objects: processes results in manipulation of objects. It could be physical or informational.

Activities: processes could involve two types of activities: Managerial (e.g. develop a budget) and Operational (e.g. fill a customer order).

Once a strategically critical business process has been identified for acquiring increased process efficiency and productivity depending on the above characteristics, searching for ideal information system may contribute to the ultimate customer satisfaction and thus sustainable competitive advantage.

Business process recognizes involvement of activities of across or between organizational subunits and both internal or external customer satisfaction in order to achieving ultimate market positioning.

Selection of business process for re-engineering depends on issues like strategically critical for efficiency development, feasibility of effective implementation and immediate action needed for improving malfunctioning areas. Davenport (1993) says 'process innovation involves massive change, not only in process flows and the culture surrounding them, but also in organizational power and controls, skill

requirements, reporting relationships and management practices'. He covered bit more extended areas like power & structure, skills of human resources in consideration. BPR can be held in intra- functional, inter-functional and cross-organizational basis. Intra and inter-functional BPR help improving efficiency of internal value-chain as well as cross organizational. BPR also makes cross-national supply-chain network more responsive. Environmental responsive firm learns faster than other and faster leaning ability is a rear resource. Core competence derives from the ability to learn faster than your competitors may be the only sustainable competitive advantage. Fielder (1994) says that 'a well–orchestrated re-engineering effort should involve IT–enabled BPR projects that were well-integrated with corporate strategy'. BPR without enabling IT advantage is narrow focused but IT enabled BPR is wider in advantages. According to Hammer "reengineering requires looking at the fundamental process of the business from a cross-functional perspective … assemble a team that represents the functional units involved in the process being reengineered and all the units that depend on it. The team must analyze and scrutinize the existing processes until it really understands what the process is trying to accomplish … rather than looking for opportunities to improve the current process, the term should determine which of its steps really add value and search for new ways to achieve the results." In his literature one idea is clear that any ad-hoc action for process improvement would be a disastrous. Followed by the above discussion it could be apprehended that empowerment of team member, team work, interpersonal relationship, loses control are for acquiring greater responsible behavior, enriched culture, and improved trust & transparency which are critical for BPR success.

BPR might create awkward situation in the event of improper precaution of implementation. Potential barriers in the implementation process need to be addressed adequately. Barriers of successful BPR implementation have been identified by Hammer ad Stanton (1995). These barriers are as follows:

1. Individualized approaches – mostly ad hoc, lacks systematic focus;
2. organizational cultural–politics/turf battles to secure processes as they are professional tribalism: doctors, nurses;
3. Failure to reconcile the difference between improvement and redesign;
4. turnover/changes in key personnel brain drain;
5. Difficulty in identifying critical business processes as against other numerous processes;
6. Lack of knowledge of the essential tools and techniques, particularly process flow charting and organizational mapping;
7. Top management not aware of key roles and responsibilities;
8. poor coordination/lack of clarity of purpose;
9. Failure to identify cycle time of key processes from the patient's perspective because of insular thinking: we know how the process should work; and,
10. Obsessed with process identification rather than process excellence and service leadership.

Role of Information Technology in BPR success

IT and BPR have mutual dependent relationship. Increased capability of IT could help BPR in terms of transactional efficiency, geographical integration, automation for faster processing, increased analytical ability, sequential processing, informational warehousing and data mining, knowledge management for effective decisions and tracking logistical movement. BPR by turn helps new innovation of IT with enriched scope of application. Hammer and Champy's first book, *Reengineering the Corporation* (1995) note that 'BPR is a fundamental rethinking and radical redesign of business processes whereby the essential enabling mechanism is information technology'. IT is the additional of all other critical success element of BPR. Davenport and Short (1990) claims that BPR requiring to take a broader view of both IT and business process, and of the relationship between them. It should be viewed more than automation of and mechanization rather it should be considered as an innovative means of fundamental reshaping in the existing business processes. It helps to increase the degree of collaboration, which is very much essential in cross-functional and cross-organizational integration. Without utilization of IT capabilities, it would possible be an almost fallacious imagination for reducing the cost of transaction, geographical integration, data and information analysis, tracking goods movement, time compression, artificial intelligence etc. Hammer's principles of reengineering pervade necessity of IT and inevitability of effective implementation. He suggests that:

- Organize around outcomes, not tasks;
- Have those who use the output of the process perform the process;
- Subsume information processing work into the real work that produces the information;
- Treat geographically dispersed resources as though they were centralized;
- Link parallel activities instead of integrating their results;
- Put the decision point where the work is performed, and build control into the process; and,
- Capture information once and at the source.

It can genuinely be concluded from the Hammer's principles that reengineering a process should be focused on result oriented proactive outlook towards problem areas that are to be deal with timely manner where proper system solution is vital.

Value Oriented Knowledge Management System (KMS)

Knowledge is a kind of transmitted information, intuitive understanding and time based experience used by managers to take action oriented decision which is supportive to sustainable competitive advantage over the competitors. Knowledge is the primary source of value but without management of knowledge it would be wasted information. It may be collected from different out sources or stored in the different levels of the management. After synchronization of all those collected knowledge into potential source of value, knowledge turns into critical resource. E-learning and e-business accelerates the process of information conversion into knowledge followed by the value generation for customers.

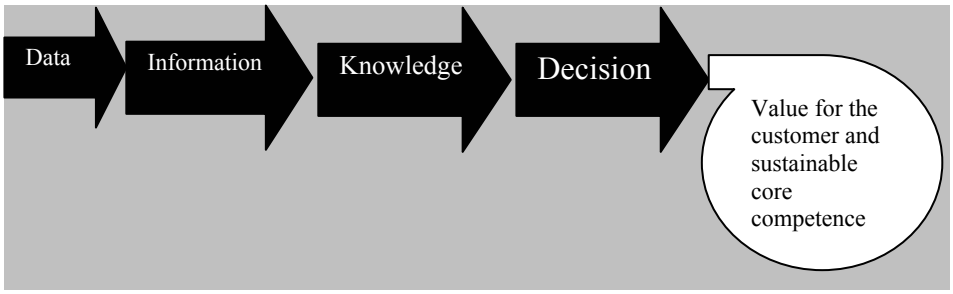

Diagram 1. Process of information conversion into knowledge.

Further, Malhotra (2000) 'Knowledge management caters to the critical issues of organizational adaptation, survival and competence in face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovation capacity of human beings'. IT alone can perform some logical to convert potential information into usable knowledge resources, renewal of archived knowledge, creation of new and innovative application of knowledge in new products and services that enhance market share. Information technologist believes that the mere investment and innovation in the area of IS will be the ultimate solution of successful business operation. Because of that, focus of IT managers is being deviated from planning and investing in human resource responsible for using that information system and the culture of how they should react and interact with each other and the system operation. Previously information system researcher (applegate et al. 1988) of Harvard Business School believed that 'Information systems will maintain the corporate history, experience and expertise that long-term employees now hold. The information system themselves—not the people – can become the stable structure of the organization. People will be free to come and go, but the value of their experience will be incorporated in the systems that help them and their successors run the business'. After experiencing huge but nearly futile expenditure on IT intense management information system (MIS) project, quest for business excellence. MIS administrators are now admitting necessity of due care on knowledge worker planning and development program than ever before.

Appropriate Human Resource (HR) Strategy will take care of the strategic employees' career progression and development for acquiring greater devotion in new process innovation, which ultimately contributes to the customer benefit. Proactive of integrated KM system can give an ideal understanding of successful MIS in order to gaining competitive advantages with overwhelmed customer based on value. (cf: Oracle Magazine, 1998) defies 'Knowledge Management promotes an integrated approach to identifying, capturing, retrieving, sharing, and evaluating enterprises information assets. These information assets may include database, documents, policies, procedures, as well as the un-captured tacit expertise and experience stored in individual's heads'. Contemporary thought of knowledge is resource for value generation like other organizational resources, which deserves due care as a source of competitive advantages.

In the business enterprises, knowledge resource may be classified into two basic categories like implicit or tacit and explicit knowledge. Explicit knowledge can easily be codified, digitized, verbalized and

materialized. It can be transmitted within or outside of the origination through EDI embedded in the internet or Value-added Network (VAN) system because of its structure nature. This type of knowledge produces physical value (PV) that embedded with competitive advantage but easily be replicated by the competitor firms. Tacit knowledge can not be verbalized, copied, distributed because of intangible nature that is deeply embedded into an organization's prevailing culture. Represents virtual value (VV) of sustainable source of core advantages. For receiving better advantage of KM, knowledge executives need to locate and blend all available explicit knowledge with indigenous tacit knowledge. Information management plays direct role on explicit knowledge by shifting its place and location with the use of EDI, Intranet,and Internet technology, which in turn improves the quality of tacit knowledge .

An accepted principle of knowledge transformation is called knowledge Management System (KMS). System differs depending on the nature of environmental stability. Table-1 explains expected action against different business challenges.

Table 1. Challenges of KMS under stable environment versus KMS under discontinuous shift of environment.

Areas of business challenges	KMS under stable environment	KMS under frequent but discontinuous shift of environment
Business & Technology Strategy	Pre-set outcomes for continuous incremental shift of environment	Continual re-engineering to cope with discontinuous environmental shift
Organizational control	Greater control but less power, structured system or work, control for consistency	Less control but greater power, self-responsibility for creative innovation
Information Sharing Culture	Based on contractual, mutually benefited and destined beforehand but controlled	Based on trust, shared vision and goal for generating continual overwhelmed value for the customer
Knowledge Representation	Structured, reliable to the right person on demand	Creative synthesis of information for molding into valued knowledge asset to the demanded person on demand
Organized structure	Top-Down, restricted and bureaucratic control	Bottom-Up, comprehensive nd self-organized
Management Command and control	Instructed to peruse certain objective under pre-designed trajectory	Provocation for pulling out commitment to attain goal under self-design trajectory
Economic returns	Returns according to normal business life-cycle	Incremental returns according to continual re-energized business life-cycle

Source: Hammer Champy (1995).

Critical Considerations of KMS followed by Competitive Supply-Chain

In the era of IT predominant knowledge economy, a firm can directly benefit from KM with bottom line savings such as cheaper communications, faster decision support, quicker customer service and tracking the movement of supply. Degree of access and integration of data, information and the degree of interaction of sustainable processes across the value generation network are the prime challenges of sustainable supply-chain partnership. Partners across the up and downstream of the value network need to share information extensively in order to streamline their core competences.

In order to practice a dynamic and environment responsive value-chain management, a distributed but integrated KM system needs to be faceted so that all partners have a shared mindset. The mindset has to be geared towards enhancing purposeful creation, use and application of knowledge appropriate to their respective corporate context and common strategic goals. All strategic partners should bring a significant shift in corporate culture and managerial outlook so that the gap between the parties remains small. A minimal gap is conducive to achieving strategic advantages by gaining new markets, achieving economies of scale, reducing time to get into new market niches, and acquiring or developing new competencies. Prahalad and Hamel (1990) noted that "strategic and core competences can open access to niches to contribute to customer-focused value in end product, hence differentiating a firm from its competitors. Core competence stems from long-standing inherent business practice and experience of a firm or partners of the supply-chain, which cannot be imitated or hired by the follower, rather it needs to grow in the firm as the time goes by.

Once a value network has been formed, the efficiency of transferring knowledge throughout the network becomes a strategically critical issue. Respective member firm needs to take some integrated plan of action across the business processes so that internal value-chain will be consolidated particular and total value network will be competitive in general. Elements that deserve special care in these plans of action and its relationship are depicted in the diagram 2. The authors have named this relationship as the Hexogen Bond in Business that is required for critical considerations of effective KMS. Based on the previous discussions and analysis, we have proposed a Hexogen Bond Model for effective KMS. In this model, we describe the critical considerations for the proposed model which is based upon the theory described above and the practical experience gained in a 100% export oriented ready-made garment industry.

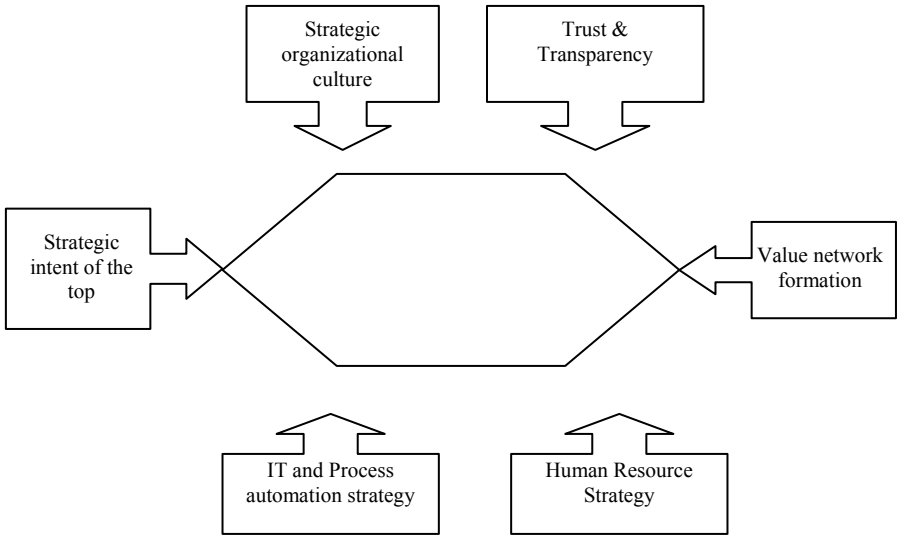

Diagram 2. Hexogen bond model for effective KMS.

Strategic intent of the top management: Anything promising business success should be initiated and supported by the top authority. Authority needs to be proactive in action in the event of dynamic and discontinuous development of business environment but can be reactive when firms have to be accommodative in order to keep pace with the continual environment changes. An up-to-date panoramic vision is essential in the mind of the business leader, which will help him or her to bring fundamental change to the business leadership style.

Strategic organizational culture: Organizational culture is the kind of beliefs and value share by all members of a firm. Adaptive and flexible culture system may be useful in the two different situations. In the adaptive situation firms are inclined to external adoption in order to benefit from a partner's intellectual capital and share peer experiences and tend to seek resources from outside. Conversely, flexible culture is more inclined to exploring internal intuition and experience. Firm tend to rely on learning by experience for surviving and thriving in the face of challenges of turbulent environment.

Both the adaptive and flexible culture system will be enriched when free flow of information will be guaranteed. In order to bring guarantees into day-to-day business operation, it is essential to undertake re-engineering programs in the business culture. Scholars have asserted in their reengineering recommendations that BPR must not ignore corporate culture and must emphasis constant communication and feedback. The critical areas of culture that need to be radically redesigned are management system and processes (e.g. management attitude towards communication and direction, appraisal system, etc., management practices and work methods (e.g., management attitude towards planning and investment in people, leadership style, safety and social compliance, benefits etc.), workforce activities (e.g., unionization based on collective conducive rather than collective bargaining) and senior management activities (e.g., failure to understand a vision of the tip management, failure to anticipate change and failure rearrange themselves).

Trust and transparency among the partners of the value-chain: Trust can be defined as how a partner responds to the other partner's prevailing series of actions. Anyway, the degree of transparency depends on the level of trust between the partners. Subsequently, good communication and knowledge transfer will occur with the respective partners. Tacit knowledge dissemination is particularly dependent on trust and transparency between the parties. The level of trust and transparency and goodwill of business operation and reputation have a diagonal relationship. Prior experience of fair business dealing constitutes a secure foundation for this relationship. The consequence of prior reputation is effective cross-functional team that may help smooth transfer of implicit knowledge among the strategic partners of a supply-chain. Firms which are successful in realizing the full returns from their technologies and innovations are able to match their technological developments with complementary expertise in other areas of their business, such as

manufacturing distribution, human resources, marketing, and customer relationships. To lead these expertise development efforts, cross-functional teams can ensure purposeful knowledge ventilation and thus an enriched repository of supply-chain partner's knowledge.

***Value-network formation type and structure*:** Types of supply network formation have some deep rooted impact on knowledge transformation system. In the vertical network environment there are two or more prospective parties in an equitable participation e.g. joint venture or acquisition. It is a serious commitment from both the parties in order to share complementary resources, skills or knowledge assets such as technological know-how, 'feeling the pulse' of the domestic market, synergy in business processes and economies of scale for capacity utilization. It is desirable in comparatively stable business environment and favorable for transferring both explicit and tacit knowledge. In the virtual network environment parties go into flexible non-equity forms of contractual relationships. Control is contractual and based on formalized obligations. It is desired in the event of volatile business environment will limited but specified area of knowledge resource transfer. Desired control structure is cross-functionally distributed but very much integrated with the nodes of the information system. IT enabled KMS invigorates virtual supplier-network partnership. A radical rethinking in formation of supplier network relationship may bring desirable competitive advantage in the market.

***Human resources strategies*:** Human resource strategy is one of the major scrambling areas of smooth transfer of information and knowledge. People responsible for using designated KM system and their ability and willingness to produce and practice evolved knowledge resource are important. People are most important asset. Technologies, products and structures can be copied by competitors. No one, however, can match highly charged, motivated people who care. People are firm's repository of knowledge and they are central to company's competitive advantage. Well educated, coached and highly motivated people are critical to the development and execution of strategies, especially in today's faster-paced, more perplexing world, where top management alone can no longer assure firm's competitiveness. Empowerment is an essential principle of BPR as well as total quality management (TQM) practices is eventually desirable for dynamic KMS. But empowerment people must have the ability to visualize relation between empowerment to do the right job and rightly rewarded for further motivational development. Selecting suitably skilled manpower, focused with the upcoming challenges derived from the competitors, is important. A total rethink of recruitment, selection, and training is preferred.

***Information technology and process automation strategy*:** System of proper information technology needs to be selected or tailored in a way that the desired outcome from the implemented KMS can be attained. Data and information will not generate as expected for the system if the designated person feels insecure for the obstruction of career development or blocked with the implemented technology that responsible for knowledge transfer. IT enabled knowledge generation and transfer system will be resisted or neglected in considering expected job loss. People need to be trained and educated as the sophistication of technology has been improved. Risks of IT need to be anticipated and alternative action plans need to be designed in a way that risks can be reduced.

The latest technology does not mean the best alternative at all the time to all users. Technology should be used for radical rearrangement of business processes so as to reduce number of actions and improve efficiency. In case of technology selection to meet real-life business challenges, it is needed to include users as well as technologists. Prior cost-benefit analysis is to be done in the use of new technology. IT strategy should be implemented and directed under the leadership of an IT educated person, if not the information technologist.

According to the hexogen bond model described in this paper, all these six essential elements have to be planned, formulated, implemented and followed-up in a way that an ideal equilibrium can be maintained. Before starting this new plan of action for fundamental redesigning of the existing business processes, the use and objective of knowledge management system have to be determined. Determination of objective will eventually determine the degree of re-engineering.

Conclusion

This paper tried to develop a relationship between IT enabled BPR and KMS. The main purpose of KMS is to ensure smooth and reliable transformation of information among the individuals and groups. If a company

wants to practice this innovative management tool then some strategic elements essentially need to be re-arranged. The objective of those re-arrangement processes is to operate business process more efficiently and effectively than the competition. Of late, effectiveness and efficiency in the business process are inculcated on the basis of speed and accuracy of market responsive decision making, implementation of decision, and continual sensing system of the business environment. In last few decades new innovations in the field of information technology are piloting total business practice into a new realm of relentless challenges. By virtue of IT, knowledge management system (KMS) has been more streamlined than ever before. The obvious consequences of the systematic streamlining are the lower cost and bureaucracy for processing business processes, productive communication and the time based competitions. Progressive business leader should think of using BPR as a shield for preventing desired ominous challenges from the business environment. It can be argued that business process redesign has been widely accepted as means of leveraging the power of information technology to change organizational processes radically, resulting in substantial improvements in corporate effectiveness and efficiency. Because BPR is goal oriented and time bound one-off measure for business process improvement, a continual development (principle of TQM) for further re-adjustment of the processes may ensure sustainable market competitiveness. So the secret of successful IT enabled knowledge management system can be boosted by rightly designed business process reengineering.

Mutual relationship between the six critical elements, designed in hexogen bond model in business need to be experimented and tested with a view to finding necessity of action equilibrium for achieving unique value creation system. Urgency and degree of IT enabled BPR for effective KMS is also needed to be tested in the context of different industries.

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