Information and Business Process Re-engineering through Application of Information and Communication Technologies (ICTs)

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Abstract - Advances in Information and Communication Technologies have facilitated significant developments in information engineering and business process improvements. Today, most organizations invest on ICT and information solutions for more efficient information management and consequently develop more effective business processes. Information management lays a significant role in re-engineering of business processes. This paper is based on review of literature related to the relationship that may exist between the application of ICT solutions and management of information that facilitates business process re-engineering. It also looks at the potential benefits of ICT application in design of business processes to improve business. Results from this research indicate that ICT solutions and initiatives play a significant role in improved information management and therefore re-engineering of business processes.

Keywords - Business process reengineering (BPR), Information Engineering, Information Management, Communication Technologies (ICT).

I. INTRODUCTION: BUSINESS PROCESS RE-ENGINEERING (BPR)

BPR is often achieved via re-engineering of contents and structure of corporate information. What’s more, was an idea thought up and embraced by industries in the nineties. It was behind downsizing campaigns during that time and ended in disasters for many organisations which gave BPR a bad name with failures beyond 70%. This is because organizations failed to realize the scope and resource requirements of BPR. BPR eventually found its way into the mainstream and has influenced management. The idea behind it was that businesses can be re-thought and redesigned from the bottom up rather than through an incremental process of improvement. Business Process Reengineering (BPR) focuses on the redesign of individuals, internal systems and processes in response to external forces in order to achieve sophisticated objectives.

BPR has some important insights to offer. Organizations processes can be redesigned from the bottom up rather than through an incremental process.

This stops new processes from relying on other old processes giving the new processes freedom from working with old processes. The new processes will influence the design of the information system and a new information system will influence processes. This makes IT directly related to BPR.

BPR took a blank page approach and implemented radical change by totally redesigning an organisations processes. This “blank page” approach to BPR promoted by early practitioners can be a dangerous path. Issues that arise are things such as another inefficient system could be created, Valuable knowledge from the current system could be lost, processes that work could be ignored and the scope of the problem can be underestimated. Modern BPR projects don’t always use a blank page approach. Most BPR projects take the existing business process as starting point (Vullers, Reijers). Business professionals and managers then try to redesign the processes into alternate processes. The new process design is then implemented by IT specialists and change management experts to put the new processes in place throughout the organisational structure.

Generally BPR involves a large amount of analysis. This analysis is about discovering how a business processes currently operate, how to redesign these processes to eliminate the wasted or poor processes, improve efficiency, and how to implement the process changes in order to gain a competitive edge. This is because Business Process Reengineering has promised large financial benefits to businesses that undertake major process change initiatives. Firms which undertake a BPR project reported success in cost saving, quality breakthrough, better customer services, time reduction and revenue increases [4].

Traditional business structures have a silo mentality where each department is an independent vertical structure. The removal of silo mentality is one of the things BPR does. BPR transforms a company from one based on functions, such as accounting, marketing and manufacturing, to one based on processes, such as order processing, cutting across the boundaries of departments. This is a repeated statement from other papers that we have read.

This cross organizational restructuring leads to a smart
use of people and processes. It is built around technological innovation that radically changes the way products and services are produced or delivered. A relationship between cost-saving technologies like automation has been identified to have the ability to transform organizations to the same degree as scientific management did in the past. Technologies such as RFID chips and the internet help with automation and performance increases.

Information technology is an important factor in BPR. This backs up the claim by Hammer [6] an early practitioner who says that Information technology is considered to be the key factor in the implementation of BPR. This is because it facilitates firms to gather and analyse information, develop strategic visions, find the best approach for process redesign and allow collaborative teamwork [4]. Other research that indicates that Information technology is a good complement to organisational change and can take five to seven years to implement fully and for performance to reach their maximum potential [8].

II. BEST PRACTICE FOR BPR

A literature survey in this field, extended with actual BPR experiences, has rendered 30 practices that are often applied in the redesign of a business process. BPR Practices are normally referred to as BPR heuristics. Business process reengineering 30 best practices can be summarised into six large categories:

<table>
<thead>
<tr>
<th>Task Rules:</th>
<th>A focus on optimizing single tasks within a business process.</th>
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<td></td>
<td>Task elimination</td>
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<td></td>
<td>Task automation</td>
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<tr>
<td>Routing Rules:</td>
<td>They try to improve upon the routing structure of the business process.</td>
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<td>Control Relocation</td>
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<td>Parallelism</td>
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<td>Allocation Rules:</td>
<td>Involve a particular allocation of resources to activities</td>
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<td>Case Manager</td>
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<td>Resource Rules:</td>
<td>Focus on the types and availability of resources.</td>
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<td>Empowerment</td>
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<td>Rules for external parties:</td>
<td>They try to improve upon the collaboration and communication with clients and third parties involved in the process.</td>
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<td>Outsourcing</td>
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<td>Contact reduction</td>
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The idea of process reengineering seems like a good idea for business development for the future. Reworking the processes of a business to streamline work and cut costs brings benefits to business and saves time and budget. I’m not too sure about the radical change that some BPR enthusiasts believe in. Extreme BPR seems like a good choice if the correct conditions arise. If the problems occur in only one section of a business it may be better to reengineer a single process or to even use the original processes to help launch the BPR effort. This would have to be decided after analysing the processes.

It is agreed that the opinion that information technology is an important factor in BPR. There is also the opinion that information technology is one of the major forces which cause BPR initiatives. New technologies usually effect how an organisation does business and may require some organisational process restructure.

Looking at the BPR Heuristics you can see how information technology can help. It can help with such things as Task elimination, Task automation, Parallelism, Control relocation and empowerment. I can see where Hammer [6] got the idea that Information technology can help with BPR. Information technologies unique attributes encompass these major BPR Heuristics.

III. ROLE OF ICTS IN INFORMATION MANAGEMENT AND BPR

Many academics conclude that there is a relationship between IT and BPR. Most say this relationship is positive and that IT is a driving force behind productivity. This contradicts what failure rate statistics show since they say failure rates are very high, estimated at 70% [8]. These contrasting views lead to research to find out what the answer really is.

Studies suggest that Information technology has a synergistic relationship with process redesign [8]. This idea is mentioned across a wide range of articles [5]. Further research examined these IT-BPR relations to measure its advantages. Businesses were independently examined depending on the focus of the redesign (cost rationalisation or work restructure). When the focus was work restructure they found that there is a positive performance association with respect to production and market values.

When IT-BPR has a cost rationalisation focus it was found that there was a significant relationship with production value but not market values. While the idea that the relationship between organisational performance and an organisation’s IT and process redesign portfolios vary by the type of the process redesign had mixed results. The association between organizational performance and the interaction of an organization’s information technology and process redesign portfolios varies by the type of process redesign pursued: cost rationalization or work restructure.

It was found that information technology has three roles in the productivity of businesses. It provides the necessary information exactly when and where it’s needed so an organisation’s employees and managers can use that information to help run the business. It helps Integrate processes and functions and makes it easier for customers to do business with the organisation. Their results show that technologies facilitate firms to optimize business processes and that IT is a necessary complement to process redesign efforts and positive and significant payoffs from BPR only appear in situations where IT is implemented in the processes redesign [8].

A BPR initiative can be seen as a combination of organisational, social and technological learning processes and technological implementation [11]. BPR is comprised of
many factors which govern the success of the project. These factors can affect each other and some can even be barriers to project success. When an organisation begins a project of process change there is a risk of excessive focus on the system and its processes. This underestimates the importance of people who are the deciding factor of the project.

BPR is largely dependent on the organisational culture and context [12]. An organisation’s culture may act as a strong barrier to BPR. An assessment of an organisations culture is a good place to start when beginning a BPR project. The study of social and political context within the organisation can show if a BPR project would be effective even before beginning. This is because an organisation’s culture is a large influence on the way a business accomplishes a task using information technology to gain advantages on competitors and efficiency. Formal modelling methods may assist in uncovering any potential frictions, while at the same time it may also increase the organisation’s understanding about its core activities before the BPR project is even launched.

An organisation’s willingness to change is not usually evaluated. These results in the possibility of wrong decisions related to the introduction of a new system and related processes [11]. The organisation’s culture can also be harmful to the implementation of new systems and processes. Certain aspects of the organisation’s culture could lead to system rejection. Since the organisation’s culture and its actors can have such a large effect on projects effectiveness it is important to analyse it before any BPR project is undertaken.

Good leadership from senior executives and management is extremely important to BPR Projects. For IT systems to be effective they need the support of management. Uninformed decisions by management can have negative consequences to the project. Managements support would also help the organisation overcome the initial resistance to the extra training involved in learning the new systems.

If employees in a business can embrace changes and creativity business process reengineering projects usually have a higher chance to succeed. This is because employees in an innovative organisational culture have the will to learn, take risks and share information instead of what happens in the opposite scenario where employees resist. This in turn has an effect on the effectiveness of businesses technology adoption because employees are willing to learn and try new things. It may be possible to create a technology-tolerant or even friendly atmosphere which would help the organisations uptake of new technologies.

The success of a BPR project also depends on the stakeholder’s co-operation. Without the support of stakeholders who affect or are affected by the changes to the organisation the BPR effort may break down and fail. This makes the stakeholders support an important factor in the success of a BPR project. They are the one who ultimately decides the effectiveness of the project. The more flexibility an organisation’s BPR effort needs the more important the co-operation of stakeholders is to the project. Their resistance to change can drive a BPR project to failure.

Undertaking a BPR in a time of organisational crisis is seen to be problematic [12]. When issues in an organisation have got out of hand adding more pressure to the organisation may lead them into disaster. It is suggested that change should occur in times of normal business. This can make it harder to justify such a project. Motives that are used to justify BPR projects are such things as cost savings, speed benefits for the business and customer service improvements. Cost is not a feasible reason to undergo such projects. This is because IT investments do not usually create much profit by themselves but provide cost savings to an organisation. Both speed and customer service advantages can translate into cost savings but are hard to quantify.

It is suggested that market pressure is a factor in the adoption of Information technology. The pressure comes from trying to stay competitive other businesses. By adopting new technology and processes a business can avoid a competitive disadvantage. Information technology changes constantly and this effects the business environment. In these ever changing environments businesses are more aware that they need to accept new technology in order to keep competitive.

The old processes from organisations can be fragmented and have poor flow. This is mirrored in their IT systems. Before any new IT systems are implemented the existing business processes need to be analysed and if any issues are found these processes are redesigned and streamlined. This will assure that the new Information system is streamlined and fits into the businesses current processes.

Other factors to consider in a BPR project are top management support, a low perception of potential threat by the project, employee satisfaction and the integration between the old and the new systems.

Ramirez et al [8] has outlined suggested actions which to be taken when doing business process reengineering as follows:

- Managers should consider information technology and process redesign as a way to improve the company’s performance.
- In the short term, managers can improve performance, especially production efficiency, by focusing on how work is structured in the firm.
- For long term market impacts, their results suggest that managers should be more conservative with their change efforts. Instead of implementing change at all levels of the business concurrently it is better if process redesign implements change at a more manageable scope.

Generally, this paper supports Ramirez [8] when they mention that continued innovation in IT will make sure its role in process redesign will not decline and the more that business becomes reliant on information technology the more it will become the focus of process redesign. With new technology solutions always being developed old systems will become ‘legacy’ and need to be replaced this may lead to process redesign.

It is thought that a modular approach to large BPR projects makes it easier to implement the only issue I have with this is how the new process interacts with old
processes. Would the new system fit in with the old systems? The connection between legacy systems and the new systems could create complications.

It is agreed that with the idea that the association between an organization's information technology and process redesign portfolios is positively and significantly associated with an organization's production efficiency.

This relates to the point of the alignment of business and IT. If IT is taken into account in an organisation’s BPR plan then the outcomes in the organisations production efficiency will be increased. I think this is because information technologies role is an enabler and a form of both centralisation and decentralisation in an organisation allows users to work more efficiently. I agree that managerial support for the consideration of the benefit of IT in BPR is important. Without the support of top management the project may fail.

It is fair to say that view on the importance of organisational culture in technological uptake. Without knowing the willingness of employees to adopt a new system the new system may be rejected by employees. So the analysis of organisation is important to the success of the system.

IV. BPR AND INTERNET TECHNOLOGIES

BPR is built around technological innovation that radically changes the way products and services are produced or delivered and IT can help businesses expand their information reach with the internet and other emerging technologies. As we move into the future the internet is becoming more of a factor in everyday life and that includes business. The internet creates opportunities that never existed for businesses before. The internet is enabling organisations to build new business models in which they are directly linked to customers, suppliers, and business partners. Factors such as this lead to a change in organisational structure. It gives a direct link to customers/clients at a low cost and creates new ways of marketing, sales and customer support [7].

With the rise of the internet and internet services processes will become more decentralized. Process support systems must evolve to work well in a decentralized and user-driven computing environment. It is mentioned about intranets providing centralisation and decentralisation which can be applied to the internet “the same information can simultaneously appear in more than one place through the use of shared databases, demonstrating that experts, to some extent, can be substituted with expert systems.

Businesses need not choose between centralization and decentralization as both modes of functioning are available simultaneously in the intranet.” [5]. This makes the internet very useful in turning over control of a process to employees in other branches of organisations while still having centralised access for management to oversee the system. This centralisation and decentralisation can help with process redesign in such things as parallel tasks and employee empowerment.

The internet’s ability to democratise helps users to help themselves. By democratization, it means a shift from central control of IT services to a greater ability for end users to help themselves. If employees are empowered to take decisions independently their work may result in smoother operations with shorter lead times.

Examples the democratization content are Blogs and Wikipedia. Given the strong bottom-up forces on process applications, it is suggested that to business processes need to be democratized, with real economic benefits to be gained. This is much like the BPRs idea of control relocation [10] where a business relocates control towards other parties to streamline processes.

Democratization is not only about turning over control of a process to employees. It is also about getting the best deal, or about achieving better access to buyers and employers. To take advantage of online services, companies need to redesign their business processes in a more malleable way to take advantage of the broadest range of services and infrastructure capabilities.

The involvement of internet technologies on an organisation has a positive effect. It allows organisations to both centralise and decentralise their information systems and give control of processes to users. Users should be taken into account in the design of the system to maximise productivity. This makes it a good tool for BPR as it can be used as a tool to help the availability of information across an organisations structure to help users achieve their goals.

The same idea can be done through the use of an intranet.

V. ALIGNING ICT WITH BUSINESS

Scholl.H [12] states that Business and ICT strategy must be tightly coupled. This is achieved through business and IT alignment. It is argued that the strategic alignment of business and IT is necessary to efficiently use IT assets to assist a business’s management and practices. Businesses use the term “Aligning IT with business” in the environment of business process reengineering and enterprise resource planning (ERP) systems. Business processes can be streamlined without the use of information technologies, but enabling the role of IT in BPR has a much larger beneficial effect on the organisation [12]. This larger beneficial effect on the organisation is what Aligning IT and business tries to achieve, it is about the effective implementation of IT in an organisation. Most organisations implement a CIO (Chief Information officer) to co-ordinate IT strategies with the businesses strategies.

The alignment of business and IT is important to the implementation of a BPR project. The cohesion of BPR and IT strategies has shown greater success in redesign projects [12]. Without the support from management the process may fail. One of the issues with the alignment of business and IT is that not all organisations see enough of an importance in IT. Some businesses don’t even know the role that IT plays in their organisation [1]. For the success of a BPR Project, management and executives need to see Information technologies role as an enabler and see its ability to drive organisational productivity. IT should be seen as a partner in planning the future of businesses and organisations.

A survey [1] in 2005 asked IT managers, directors and executives of around 100 companies ‘what is IT’s role?’ The results show the executives don’t know where IT fits into their organisations and also don’t know what it should be doing. Some respondents mentioned the alignment of
business but once again couldn’t define it. Some executives
gave IT an entirely passive role with IT managers giving
power to business units. Some saw IT so unimportant that
they totally outsourced their IT services. Despite some
executives having these views most organisations agreed on
the focus of IT in infrastructure, support and maintenance.
The research conclusion from the survey stated that the main
thrust of an effective IT department should be to use
information and technology to drive a business wide
productivity drive.

The problem with the phrase ‘aligning it and business’ is
the meaning of the term is very open to debate. Some say
that alignment meant that IT should collaborate with
business units. Other people say that alignment involves IT
seeking out synergies with other departments. And others
maintain that IT is an enabler and gives a competitive
advantage and an enabler of business process reengineering.
IT should be a partner in planning the future of businesses
and organisations. The problem with these meanings for
the phrase is none of them are that clear in the definition of
what IT should do for businesses.

In our view the alignment of business and IT is an
important influence on the success of business process
reengineering information technologies. Greater
understanding of an organisations structure, goals and
strategy will allow information technology to be more
focused towards the fulfilment of organisational goals,
which in turn helps the organisation function at a higher
level. IT’s role in BPR is vitally important. IT can facilitate
analysis of information to help find the best approach for
process redesign and allow collaborative teamwork. Since
IT is an important factor in BPR its understanding of
business needs and requirements are imperative to success.

VI. CONCLUSION

The information technology has a huge role in BPR this is
because information technologies unique attributes cover
most BPR heuristics. All the research papers point towards a
relationship between Information technology and Business
Process Reengineering where Information technologies
involvement has a large positive effect. I agree with their
statements on the relationship between IT and business. IT
enables the analysis information and helps find the best
approach for redesign projects.

We don’t totally agree with the idea of the blank page
approach. This is because I think BPR projects which don’t
use the current system as a starting point of analysis may
miss out on some important information which could help
develop the new system. Knowing what went wrong with
the old system and its weaknesses can show what areas need
special care and attention in the new systems. The issues can
be tested during the quality assurance process to measure the
effectiveness of the new system.

Information technologies effect on production and market
values is positive when work restructure is the focus of
redesign, but not as effective when rationalisation cost is the
main focus. This could mean that work restructure can be
used as a form of cost rationalisation although it would be
hard to quantify the cost saved by the work restructuring.
This is because not all advantages are quantifiable by a
cost savings metrics but may be observable. Examples of this
would be heightened employee morale from the new system
and increased work speed.

For IT to be used effectively in BPR it must be aligned
with business. Without the support from management the
process reengineering may be less effective than if it took
into account the importance of IT. IT should be seen as a
partner in planning the future of businesses and
organisations. I think that the alignment of business and IT
can help the effectiveness of a BPR project by giving
understanding of the business to the IT team. This allows
them to create systems which work towards what the
organisations goals wish to achieve. This is supported by
research which states that the cohesion of BPR and IT
strategies has shown greater success in redesign projects.

Information technologies such as the internet could be
used as a tool to achieve both focuses of BPR. The internet
is known for its centralisation and decentralisation of
information which can help with process redesign. Internet
technologies can allow parallel task to take place and can
help deligate processes to other users. When a organisation
makes the decision to create a online presence or transitions
to an online system it seems like a good time to think about
the processes the organisation and how they relate with the
new system.

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