

A Literature Based Review of Business Process Amelioration Methods and Techniques Regarding Service Orientation

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Abstract—The topic of business process improvement or reengineering has a long history in business literature both on the academic side and among managers, there is a lot of confusion and debate on this topic and it has not lost its popularity. The concept of reorganizing dysfunctional business processes still exists even in the twenty-first century—usually with new and more sophisticated tools and methodologies, but based on old principals. The narrowing markets, increasing competition and the recent economic crisis all stimulate companies towards continuous rationalization, cost reduction and increased efficiency to gain some kind of comparative advantage which creates a basis for the development of methodologies for process improvement. In this paper we would like to collect and systemize these process improvement tools and methods from a historical as well as from a functional point of view, researching the most important and influential academic journals. We also examine some major trends associated with this evolution process, which divert developers of these tools towards a combination of both specialization and generalization. As the production-focused approach of process improvement is inherently becoming attractive for service organizations, we also examine the service orientation of these methods and tools.

Index Terms—improvement, process, reengineering, services

I. INTRODUCTION

For almost two decades now there has been considerable discussion and even debate in the literature as well as among managers on the role, substance and interdependence of process “regenerative” or “amelioration” techniques, methods, strategies and constitutes of these issues. Despite this long and deep debate there still remains much confusion amongst researchers and even experts. However there is a consensus on the need for the improvement of business processes as the basis of the competition has moved from cost and quality to flexibility and responsiveness. The value of process improvement is now being recognized in gaining sustainable competitive advantages, yet there is a serious lack of adapting these methods within service industries.

This paper attempts to gather and review the existing literature on this topic and give a critical analysis as we try to draw up the gap between production and service industries regarding the methods and techniques of business process amelioration (BPA). This paper is the first step of considerable significant research on the development of a service logistics’ process amelioration tool carried out by a team formed at Budapest Business School College of Accountancy and Finance.

II. LITERATURE REVIEW

In the first phase of the research we have analyzed the current literature available in world leading or international scientific and academic journals. The sample of journals consists of Engineering and Process Economics, Engineering Costs and Production Economics, Journal of Operations Management, International Journal of Production Economics, European Management Journal, Journal of Management, Journal of Supply Chain Management and Production and Operations Management. In these journals we inspected 1151 papers (between 1978 and 2013), which could be associated with process improvement, reengineering, rightsizing or management. Having a closer look at the papers we found 55 that can be associated with business process amelioration. In most cases these papers show a case when one or more kinds of process reengineering tool were used. We found also many publications on methods and methodologies of process improving and reengineering, and also a relatively high number on the performance of the tools and performance change due to this improvement. There are a relatively low number of papers in relevant journals on applications and theory; this might be because of the tendency towards a narrowing development of new tools.

The evidences of these findings are shown in Table I.

Having a closer look at the temporal distribution of these publications (see Fig. 1) two trends seem to dominate. The first one is associated with the total number of publications on this topic. There was major growth in 1990, after Michael Hammer published his article in the Harvard Business Review, in which he claimed that the major challenge for managers is to obliterate forms of

work that do not add value, rather than using technology for automating it (Hammer, 1990). This initiated an avalanche in major journals. The number of papers is still

growing after a peak in 1995, when Frankenstein Economy, made in USA began (Janszen, 1996).

TABLE I. THE ARRANGEMENT OF CHANNELS

Application	Case	Methodology	Performance	Theory	Tools
- Clark, T.H.; Hammond, J.H. (1997)	- Choi, T.Y.; Hong, Y. (2002)	- Tomlinson, P.R.; Fai, F.M. (2013)	- da Silveira, G.J.C. (2005)	- Heineke, J.; Davis, M.M. (2007)	- De Bruyn, B.; Gelders, L. (1997)
- Macintosh, R. (1997)	- Done, A.; Voss, C.; Rytter, N.G. (2011)	- Verma, Rohit; Goodale, John C. (1995)	- Jacobs, M.A.; Swink, M. (2011)	- Chan, S.L.; Choi, C.F. (1997)	- Flynn, B.B. (1987)
- Williams, W.; Tang, K.; Gong, L. (2000)	- McFadden, K.L.; Hosmane, B.S. (2001)	- Wagner, S.M.; Neshat, N. (2010)	- Kim, Soung-Hie; Jang, Ki-Jin (2002)	- Edwards, C.; Peppard, J. (1994)	- Karvonen, S. (1998)
- Jones, T.M.; Noble, J.S.; Crowe, T.J. (1997)	- Ojanen, V.; Piippo, P.; Tuominen, M. (2002)	- Weng, Z. K.; Parlar, M. (2005)	- Stahl, M.J.; Zimmerer, T.W. (1983)	- Hill, A.V. <i>et al.</i> (2002)	- Lillrank, P.; Holopainen, S.; Paavola, T. (2002)
	- Saccani, N.; Johansson, P.; Perona, M. (2007)	- Seidmann, A.; Sundararajan, A. (1997)	- Das, S.R.; Joshi, M.P. (2007)		- Lockamy I., Archie; Smith, W.I. (1997)
	- Arnold, G.W.; Floyd, M.C. (1997)	- Berry, W.L.; Cooper, M.C. (1999)	- Droge, C.; Vickery, S.K.; Jacobs, M.A. (2012)		- Neiger, D.; Rotaru, K.; Churilov, L. (2009)
	- Currie, W.L.; Michell, V.; Abanishe, O. (2008)	- Perrone, G.; Roma, P.; Lo Nigro, G. (2010)	- Goel, S.; Chen, V. (2008)		
	- French, M.L.; LaForge, R.L. (2006)	- Rolfe, R.; Armistead, C. (1996)	- Hegde, V.G. <i>et al.</i> (2005)		
	- Houghton, E.; Portougal, V. (1997)	- Simons Jr. <i>et al.</i> (1999)	- Hendry, J. (1995)		
	- Purwadi, D.; Tanaka, K.; Ota, M. (1999)	- Terziovski, M.; Fitzpatrick, P.; O'Neill, P. (2003)	- Launonen, M.; Kess, P. (2002)		
	- Sarkis, J.; Presley, A.; Liles, D. (1997)	- Upton, D.M.; Kim, B. (1998)			
	- Shivappa, D. N.; Babu, A. Subash (1997)				

There was also major growth after the global financial crisis started to expand. The second trend seemed to occur in 1997, when a great number of process improvement applications and tools were developed – as a product or summation of the strong interest in this topic in 1995 (Ettlie 1997).

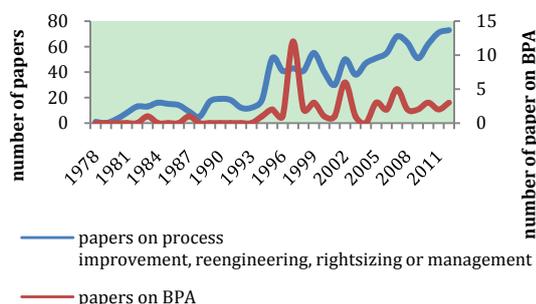


Figure 1. Magnetization as a function of applied field.

III. TEMPORAL EVOLUTION AND THE DEVELOPMENT OF PROCESS ORIENTATION OF BPA TECHNIQUES AND METHODS

There is no doubt about the importance of the continuous amelioration of business processes. The driving forces of these radical changes can be interpreted as the extension of Porter’s competitive advantages (Porter

1980, 1985, 1990) summarized by Hammer and Champy (1993) and reinforced by O’Neil and Sohal (1999):

- Customers who can now be very diverse, segmented, and are expectant of consultation,
- Competition that has intensified to meet the needs of customers in every niche
- Change that has become pervasive, persistent, faster and in some markets a pre-requisite,

The evolution of BPA dates back to the first appearance of rudimentary process orientation between 1750-1970 with the beginning of industrial period. The main focus of this embryonic process improvement phase was on labor division, cost reduction and productivity with technologies such as mechanization, standardization and depth records. Their main tools were PDCA improvement cycle and financial modeling. Rightsizing and restructuring were also used for achieving changes in formal structural relationships and their focus on business processes are pretty low (Grover & Malhotra, 1997). Their orientation is mainly functional, the improvement goals are usually incremental, and the frequency of application is isolated in time (Grover & Malhotra, 1997).

The next generation of process improving is the first phase of information period dated from 1970-90. This is the era of quality management and work efficiency with such technologies as material requirements planning (MRP) and management information systems (MIS). The main tools of this period were computer automation and

statistical process control. These tools refer to the typical application of technologies where the application focuses mainly on automating existing procedures without questioning their appropriateness or legitimacy (Grover & Malhotra, 1997).

The third generation is the second phase of the information period with business process improvement (BPI) dating back in the '90s. This is the era of process innovation and best practices with such slogans like better, faster and cheaper. At this time technologies such as ERP, CRM, supply chain models and enterprise architecture models were introduced. New tools were developed and used, like Six Sigma, TQM, BPR and best practice benchmarking (BPB). These tools and techniques have their focus on processes, and bottom-up improvements in many places with continuous and incremental scope.

The fourth generation is the third phase of information period with business process management (BPM) dating from the 2000s. The main focus of this era was continuous transformation, flexibility and modularity. Enterprise application integration (EAI), service oriented architecture (SOA) and semantic object model (SOM), performance management systems (PMS) and BPM systems are the major technologies of this era. Tools also vary from customization to BPM procedures like integrated design-build framework (IDBF), benchmarking-orientated process reengineering (BOPR), business process standardization (BPS) and event-condition-action (ECA) computing. Some of these tools have a very intensive service orientation (especially SOA and ECA), others tend to be adapted to services with more or less success. In the following parts of the paper we intend to show this attempt on behalf of the users of these tools in literature. First let us take a look at some current trends affecting this tendency.

IV. RECENT TRENDS AFFECTING ON BPA TOOLS AND TECHNOLOGIES

Standardization and amelioration of service processes does not receive as much attention from academics and practitioners as production processes. However there are significant differences between service and production (see e.g. Heidrich and Ráthi, 2012) there are tendencies for using tools clearly developed for production for the amelioration of service processes. There may be two reasons for this. Firstly the growing demand for high performance and efficiency in the service sector are leading organizations to focus on streamlining their operations and processes – due to the lack of expertise or more often to the lack of appropriate tools, misapplied tools are often used. That leads to the second reason: as production-oriented tools are being used for service processes, practitioners tend to tailor them – with more or less success.

Two issues also force these trends: production is becoming service like, and services are becoming production like. In services only uniform systems can be distributed and handled by people with different cultural roots and attitudes, which make uniformity difficult. There are two models of services that are international and prevail in the global economy: McDonaldization and

Disneyization (Heidrich and Ráthi, 2012). The former involves Ford's and Taylor's principles of organizing work in the area of services. The latter also seeks to meet the organizational and human resource requirements of the experience of consumption, the seizing of the moment, which is typical in post-modern societies. One dilemma, which has been pondered for decades in the service industry, is the choice between customization and standardization. Both have their marketing and economic rationale, but we can see them prevail in diverging areas. The central element of service management and marketing is fulfilling the individual needs, i.e. customization, while standardization is based on the principles of classical economics and considers the increase of profitability as the primary success criterion of economic activities (Heidrich and Ráthi, 2012). To achieve cost cutting and economies of scale, standardization is chosen as the way forward. In contrast, service management regards fulfilling customer demands economically as the number one issue, so quality is put into focus rather than the reduction of unit cost (Normann, 1993; Grönroos, 1990).

In production, the holonic manufacturing systems (Koestler, 1967) have many common aspects with the service concept. Holonic manufacturing systems support a more plug-and-play approach to configuring and operating manufacturing processes, and thereby address increasing efforts to meet the needs for market responsiveness and mass customized products.

It can be concluded, that the McDonald's adapted an industrial culture, but it conformed to unique consumer needs as well. The holonic approach can be perceived in two ways: (1) the implication of consumers into the service system; (2) bounded customization of "production" processes. These approaches can be identified both in the production and service sector. (Illés and Ráthi, 2012)

V. TENDENCIES IN SERVICE ORIENTATION OF BPAS

Despite the large number of BPA technologies and tools, efforts have tended to emphasize manufacturing applications over service operations. By now it has become apparent that the economies of even the most industrialized countries are becoming ever more dominated by services, however producing consistently high quality and efficiency in services has not received as much attention as in manufacturing firms (Mefford, 1993). The differences in the characteristics of manufacturing and services have led many managers to believe that BPA methods used successfully in manufacturing are not applicable in service organizations. However there is a lot of evidence of using BPA tools tailored clearly for the production sector (see e.g.: Sánchez-Rodríguez *et al.*, 2006; Willenweber and Weitzel, 2007; or Brahe, 2007). With more or less success due to the lack of standards in services, the customer-focused approach of BPI is inherently attractive for a service organisation (Nattapan, 2010). Hence, BPI methodologies have been widely disseminated and adopted, especially in the financial services and healthcare areas (Hammer and Goding, 2001; Does *et al.*, 2002; Hoerl, 2004).

TABLE II. EVOLUTION OF BPA TOOLS AND THEIR SERVICE CUSTOMIZATION

Evolution phase	Orientation	Tools	Authors	Customization for services	Authors
<i>Industrial period (1750-1970)</i>	functional	PDCA	Deming 1950,	Highly suitable	Armstrong-Stassen, Wagar <i>et al.</i> 2001, Baumann, O'Brien-Pallas <i>et al.</i> 1996, Collins, Noble 1992, Jin, Huang <i>et al.</i> 2012, Lombardi, Miner 1995, Pfeifenberger, Schumacher <i>et al.</i> 2004, Quinlan 2007, Yu, Chern <i>et al.</i> 2013
	functional	Financial modeling	(Duhaime, Thomas 1983)		
	functional	Rightsizing, downsizing	(Vollmann, Brazas 1993, Kets De Vries, Balazs 1996, Simons Jr., Wicker <i>et al.</i> 1999)		
	functional	Restructuring	(Stonebraker 1996)		
<i>First phase of information period (1970-1990)</i>	procedures	computer automation	(Bollinger 1982, Boucher, Luxhoj <i>et al.</i> 1993, ElMaraghy 1985)	Highly suitable	Atienza <i>et al.</i> 1997, Beamon, Ware 1998, Benneyan 1998, Does <i>et al.</i> 1997, Duffuaa, Ben-Daya 1995, Finison <i>et al.</i> 1993, Humble 1998, Lewis 1999, Roes, Dorr 1997, Sellick 1993, Wood 1994
	procedures	SPC	(Dale, Shaw 1991, Flynn, Sakakibara <i>et al.</i> 1990)		
<i>Second phase of information period with business process improvement (BPI) (1990-2000)</i>	procedures/processes	TQM	Schroeder <i>et al.</i> 2005, Konecny, Thun 2011, Mart ínez-Costa <i>et al.</i> 2008, Mart ínez-Lorente <i>et al.</i> 2004, Detert <i>et al.</i> 2003, Amasaka 2002, Govers 2001, Choi, Eboch 1998, Forza, Filippini 1998, Handfield, Melnyk 1998, De Bruyn, Gelders 1997, Withers <i>et al.</i> 1997, Nyerges 1996	Well suited most components of TQM on various fields	Attaran, Fitzgerald 1995; Dotzour, Lengnick-Hall 1996; McCarthy 1991; Partlow 1993; Sandelands 1994; Seath 1993; Shortell <i>et al.</i> 1995; Singer <i>et al.</i> 1993; Sohal 1994, Lemak, Reed 2000
	processes	Six Sigma	(Jin, Janamanchi <i>et al.</i> 2011, Amer, Luong <i>et al.</i> 2010, Anand, Ward <i>et al.</i> 2010, Freiesleben 2008, Goel, Chen 2008, Linderman, Schroeder <i>et al.</i> 2006, Linderman, Schroeder <i>et al.</i> 2003)	Transactional Six Sigma for IT services, banking and healthcare	Balbontin 2006, Edgeman, Bigio <i>et al.</i> 2006, Lopez 2006, Burmann <i>et al.</i> 2006
	processes	Lean concept	(de Haan, Naus <i>et al.</i> 2012, Hofer, Eroglu <i>et al.</i> 2012, LaGanga 2011, Pool, Wijngaard <i>et al.</i> 2011, Gautam, Singh 2008, Abdulmalek, Rajgopal 2007, Simons, Taylor 2007, Treville, Antonakis 2006, Vonderembse, Uppal <i>et al.</i> 2006, Kleindorfer, Singhal <i>et al.</i> 2005, Bruun, Mefford 2004, Cuatrecasas Arb ós 2002, Ben Naylor, Naim <i>et al.</i> 1999, Warnecke, Hüser 1995) Liker 2004	Principle adaptation to IT services, hotel and healthcare services, libraries and project men.	Collar, Shuman <i>et al.</i> 2012, Gabriel 1997, Holden 2011, Kimsey 2010, Martin, Hogg <i>et al.</i> 2013, Parang 2012, Simon, Canacari 2012, Staats, Brunner <i>et al.</i> 2011, Vlachos, Bogdanovic 2013
	processes	BPR	(Grover, Malhotra 1997, Hammer, Champy 1993), Hamscherr 1994, Hammer 1990	in financial services and maintenance management	Drew 1995, Drew 1994, Hao, Yifei 2011, Hipkin, De Cock 2000, Larsen, Myers 1999, Loebbecke, Jelassi 1997, Sarker, Lee 1999, Terziovski, Fitzpatrick <i>et al.</i> 2003
	processes	BPB	Spendolini 1992, Watson 1993, (Hammer, Champy 1993) Camp 1995, Zairi 1996, Legner <i>et al.</i> 1998, Macdonald 1995, Davenport 1993	none / not distinguished	no evidence
<i>Third phase of information period with business process management (BPM) (2000-)</i>	processes	IDBF	Cheng, Tsai 2008	none	no evidence
	processes	BOPR	Cheng <i>et al.</i> 2009	none	no evidence
	processes	EAI	Gable 2002, Lee <i>et al.</i> 2003	For e-governance and commerce	(Erasala, Yen <i>et al.</i> 2003, Liu 2012, Kamal 2011, Kamal, Weerakkody <i>et al.</i> 2009, Kamal, Themistocleous <i>et al.</i> 2008)
	processes	SOA	(Touzi, Benaben <i>et al.</i> 2009), Beimbom <i>et al.</i> 2009, Beimbom <i>et al.</i> 2008, Brahe 2007, Heffner 2008		
	processes	ECA	Bailey <i>et al.</i> 2002	Low, mainly for web services	(Jung, Park <i>et al.</i> 2007, Perumal, Sulaiman <i>et al.</i> 2013)
	meta processes	BPS	Bala and Venkatesh 2007; Hall and Johnson 2009; S á nchez-Rodr íguez <i>et al.</i> 2006; W üllenweber and Weitzel 2007		

VI. CONCLUSIONS AND SCOPE OF FURTHER RESEARCH

Our intention with this paper is to summarize the process amelioration tools and techniques in a structured and systematic way. The evolution, service orientation and the subject of their approach set our guidelines for this review.

We determined four phases of the evolution of BPA tools and techniques, with some relevant authors from the most impacted journals of this topic. We found that all BPA techniques, with a few exceptions, are developed and suited for production, but in many cases professionals use them for services as well – with more or less cropping and transformation as well as some success.

These findings lead us to conclude that there is gap between production and services regarding process amelioration.

The reason is not only the lack of tools, but also the specifications of services. Human intervention is common practice in services, which results in a lot of hidden factors. Thus, the success of BPA in service organizations depends very much on the fit among interdependence and the strategy's content and process.

As process thinking is becoming main-stream in services as well, it requires adequate, well defined and process oriented tools, which captured our attention as this will result in a tool that completely conforms to service processes. This topic is not simply a management fad of reengineering, but a more pervasive issue of efficiency and profitability, requiring serious attention not only from researchers but practitioners as well. In this context BPA considers process as both a business imperative and a means of understanding and explaining business activities.

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