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ROUTINE DYNAMICS OF KNOWLEDGE-INTENSIVE BUSINESS PROCESSES – THE CASE STUDY OF THE HEALTHCARE SECTOR

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Abstract: The aim of this paper is to discuss the concept of Routine Dynamics from the perspective of knowledge-intensive business processes. The traditional approach to business processes assumes control of the flow of well-structured activities that the organisation carries out to achieve its goals, and managing them focuses on their improvement through increased efficiency. However, an increasingly important role in the knowledge economy is played by knowledge-intensive business processes, which are highly dependent on human judgment, as well as real knowledge, which requires partially structured and unstructured decision-making. This demands a change in the approach to process management and its improvement, beyond efficiency only. It requires the use of the dynamism of process executors to create value by using and creating knowledge during the execution of processes. To illustrate this transformation, processes from the healthcare sector were used as a case study, as they encapsulate the limitations of the traditional approach to process management and the need to move to a dynamic one. As a result, two process models were presented, showing the need for a dynamic approach to health process management as a way to create and use rapidly changing knowledge, and to incorporate new technologies that not only increase the efficiency of processes (e.g. automate them), but above all create new knowledge, and use data on patients in real-time.

Keywords: dynamic business process management, health process management, illustrative case study, knowledge-intensive business processes, routine dynamics

JEL classification: M10, M15

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Introduction

The concept of business processes derives from Taylor's concept of industrial engineering, which was originally formulated with regard to repetitive, routine production processes. For more than 100 years of development, the Business Process Management (BPM) concept has not only covered all organisational processes, but under the pressure of business, it has undergone a significant evolution towards processes of various nature, including knowledge-intensive business processes (kiBPs) recognised as the most important processes for organisations today (Davenport, 2015; Bitkowska, 2019; Chruściel, 2019). Traditional BPM focused on efficiency improvements, i.e. faster, but more importantly, cheaper processes. However, three decades of workflow automation of routine structured BPs have resulted in a very high level of process efficiency, and the majority of such processes have already been made efficient over time (Harrison-Broninski, 2015). Consequently, process efficiency is no longer considered a sustainable source of competitive advantage, and organisations must improve their kiBPs beyond efficiency (Marjanovic, 2011).

The purpose of this paper is to discuss the concept of Routine Dynamics (RD) from the perspective of kiBPs in the healthcare sector, covering a whole suite of processes, including highly structured and routine processes, as well as kiBPs, with different degrees of intensity of knowledge. The healthcare sector is also one that remains under constant pressure to reduce time and costs (due to health workforce shortages), while improving the quality of care, along with knowledge creation and new technology absorption.

The article will contribute to research in the area of business process management by illustrating the change in the understanding of Routine Dynamics in business process management on the example of one of the knowledge-intensive sectors – the health sector. This will be the basis for further research on Routine Dynamics (RD) from the perspective of dynamic business process management.

Routine Dynamics and Dynamic BPM

Routine Dynamics

An organisational routine "is a repetitive, recognisable pattern of interdependent actions carried out by multiple actors, involving multiple actors" (Feldman & Pentland, 2003). It is difficult to find any references to "dynamism" in this definition. Routine is associated with repetition, immutability, ossification, or boredom. "Routine dynamics research seeks to explain how organisational routines change" (Pentland & Feldman, 2005). At first glance, the phrase "Routine Dynamics" seems to be an oxymoron linking the opposites. Feldman and Pentland (2003) also note that this concept reflects the paradox in management, requiring a balance adapted to the context of the organisation's operation between the ostensive aspect (routine) and the performative aspect (dynamism). According to Feldman et al. (2016), the state of stability is a short-term achievement that always precedes change. Wegener and Glaser (2021) emphasise that often organisational actors intentionally try to influence, design, or manage (routines) to achieve business goals. This approach is close to dynamic Business Process Management (Szelągowski, 2019).

Dynamic Business Process Management

Traditional BPM dedicated by Taylor to manage structured, repetitive, routine production processes enables the management of less than 30% of the processes of modern organisations (Olding & Rozwel, 2015). It assumes the identification, design, implementation, and then execution of processes, according to the assumed optimal and best possible assumed model. It implicitly assumes that this pattern has been designed, based on full knowledge of how the process is to be implemented, and therefore, the implementation of the process requires only routine, predicted activities. These assumptions are only true for structured processes.

Managing all processes in an organisation requires extending the traditional BPM to the dynamic BPM, which is beyond the limitations indicated above. Dynamic BPM is a holistic concept that extends traditional BPM to areas of application and process types that Taylor and many of his followers did not envisage. Dynamic BPM allows one to manage all types of processes in all areas of the organisation's operation, not only traditional processes for which one can prepare an optimal model in the form of a sequence of tasks to be performed before execution. Therefore, it allows taking into account the influence of the context of process execution and the dynamism, i.e. the commitment, the willingness to act, energy, and the knowledge of process executors and participants. In this way, corresponding well with Industry 4.0, or even anticipating hyperautomation (rule I), dynamic BPM also meets the standards of Industry 5.0. Among other things, it makes it possible to describe in the updated BPM Lifecycle how standard, routine behaviour in organisations is changing. In other words, it can be said that dynamic BPM includes RD. However, it goes a step further by indicating not only the results but also the actual sources/causes of changes in the organisational routine: the dynamism of employees and the changeability of the context in which the organisation operates.

Table 1. Dynamic BPM principles vs Routine Dynamics rules

Principles of Dynamic BPM	Principles of Routine Dynamics
I. Comprehensiveness and continuity (holistic view of the organisation and its processes)	A holistic view of routines (ostensive and performative)
II. Evolutionary variability at runtime (possibility of adapting processes during implementation)	(1) The performative aspect of routines is essential for the creation, maintenance, and modification of the ostensive aspect (2) Action in routines is situated
III. Completion of the process is equivalent to documenting its execution	(1) Track deviations and changes in the current routine in order to make changes to it (2) Actors are knowledgeable – the disclosure and acquisition of knowledge necessary for routine changes

Source: Own study

Dynamic BPM can be used, in practice, to manage all types of processes, also the semi-structured (structured processes with ad hoc exceptions and unstructured processes with predefined fragments) and fully unstructured processes (where it is impossible to define as priority, the exact steps to be taken, in order to achieve the goal) (Kemsley, 2011). As presented in Table 1, the basic principles of dynamic BPM are fully compliant with RD.

Dynamic BPM is focused on two goals: efficiency like the traditional BPM, and creating or strengthening the competitive position, thanks to the daily management of knowledge and the use of employees' dynamism.

Knowledge-Intensive Business Processes

Dynamic BPM is especially useful in the case of knowledge-intensive business processes (kiBPs) defined by Isik et al. (2012). As one, kiBPs require specific process knowledge, and typically, expert involvement, hard to predict and varying in almost every instance of the process. They usually depend largely on human involvement and decisions, although parts of the process could be supported by automation. KiBPs integrate data in process execution and require considerable flexibility in runtime (Di Ciccio et al., 2012). Due to a lower level of predictability compared to routine processes, kiBPs have to balance between structural elements for recurring aspects, and non-structural elements, to enable creative solutions to complex problems. Although we do not know the exact percentage of kiBPs, it should be enough to mention that in 2019, employment in knowledge-intensive services amounted to 77.9 million people in the European Union (Eurostat). These numbers cover employment in the healthcare sector that must develop business processes that are flexible, instantly changeable, have real-time responses to patients' needs, and are knowledge-based.

Methods

The purpose of this paper is to discuss the concept of Routine Dynamics from the perspective of knowledge-intensive business processes. To illustrate how dynamics and kiBPs can respond to the needs of both performance and quality improvement and knowledge management requirements, two case studies of healthcare processes are presented below.

Illustrative case studies are descriptive, in-depth and context-rich studies, and provide the reader with visually descriptive details that are important to support the research process and understand the results. This type of case study is used to "describe a situation or a phenomenon, what is happening with it, and why it is happening" (Hayes et al., 2015, p. 8). The application of this method is usually associated with a small number of case studies – one or two (Davey, 1991). Two case studies have been used to show that the RD concept has applications in numerous business processes in the health sector, whether it be routine medical consultations or specialised medical pathways dedicated to chronic diseases.

Healthcare Processes as Knowledge – Intensive Business Processes – Illustrative Case Studies

In the Knowledge Economy (KE) or Industry 4.0, "routine action" does not mean performing a sequence of the same activities (Mendling et al., 2020). In Example 1, we will analyze a medical visit/consultation. In healthcare, each subsequent "routine" procedure, and even a doctor's consultation, requires the involvement and use of the doctor's knowledge, in a manner tailored to the individual needs and condition of the patient. Implementation of unstructured processes, especially those requiring dynamic kiBPs management, even if it is seemingly an "organisational routine" such as a medical visit/consultation, requires the use of knowledge and the dynamism of employees, which duly shape the course of the process on an ongoing basis. These processes involve empirical knowledge in various forms and complex decisions, and therefore, cannot be easily reduced to well-structured models limited to popular BP improvements.

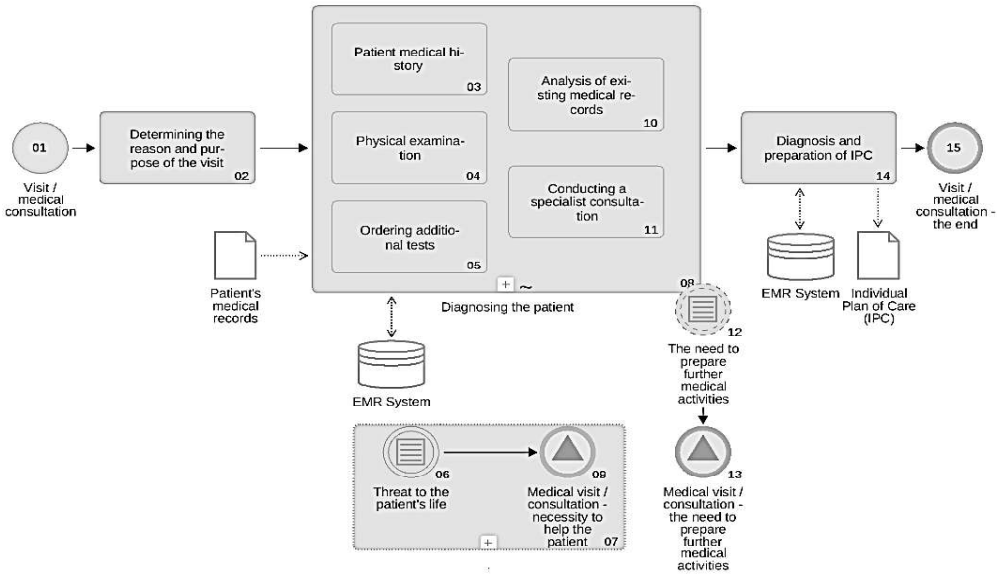

Figure 1. Process diagram of a medical visit/consultation

Source: Own study

As shown in Figure 1, the medical visit/consultation process model allows the doctor to decide whether to perform or omit individual activities, as well as arrange their order, possible repetitions or additional examinations or consultations. The implementation of this model builds an "organisational routine", the basis of which, is not the repetition of the same sequence of activities, but the involvement and knowledge of the participants, as well as its dynamic application, in accordance with the context of the process being carried out. Similarly, in the aviation industry, it is impossible to design a standard process for crisis situations. Flight controllers and airship captains operate under the ASSIST (Acknowledge, Separate, Silence, Inform, Support, Time) principle and standard checklists suggesting which actions

should be undertaken in situations similar to those described in the guidelines. However, it is the airship captains' sole discretion to decide which actions will be undertaken and in what sequence.

Of course, using the techniques of process mining or machine learning, the organisation can, and should, analyse the processes performed, and promote the methods of implementation that bring the best results or warn against the methods of implementation which may lead to failure. However, that is not the basis of its organisational routine. For kiBPs, the basis of organisational routine is employee empowerment and knowledge management because, without them, it is impossible to engage with knowledge employees to use and create knowledge on a daily basis, based on the second and third dynamic BPM principles.

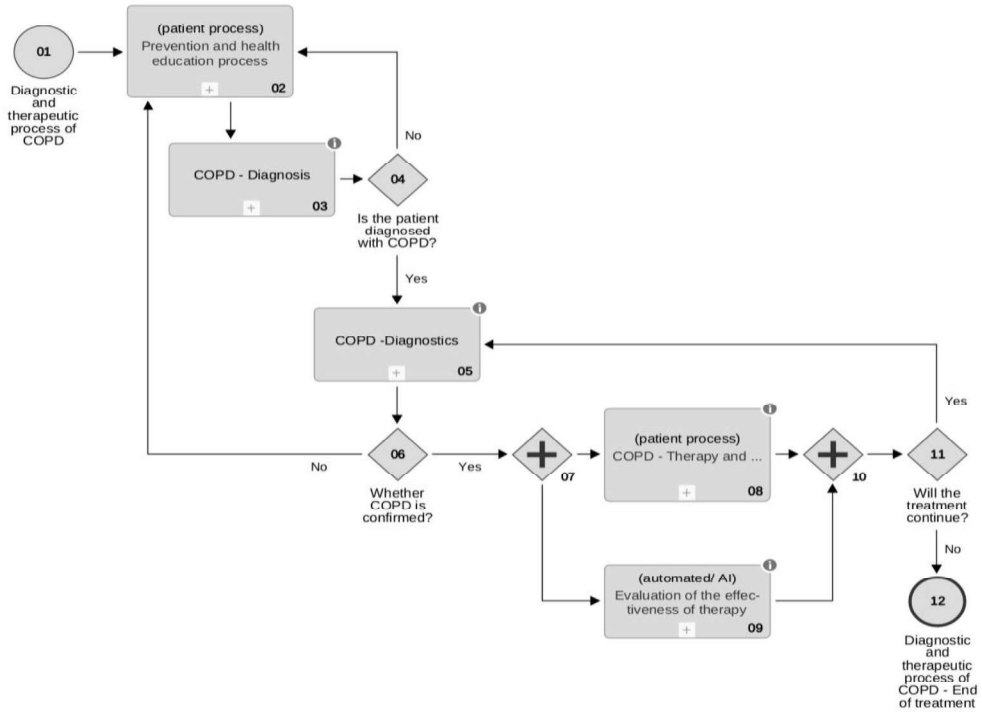

Figure 2. Diagnostic and therapeutic process of COPD

Source: Own study

In healthcare, this approach is increasingly extended to all participants in diagnostic and therapeutic processes. More and more often, clinical pathways (CPs) mapping the recommended course of diagnostic and therapeutic processes also include activities or processes that require informing and involving the patient and his/her relatives. This is especially true in the case of chronic diseases with a long-term course, whereby patient involvement is critical to successfully stop, or at least slow, the progression of the disease. As in Example 2, we will analyse a clinical pathway of a chronic obstructive pulmonary disease (COPD). In this CP, processes "Preven-

tion and health education" and "COPD – Therapy and ongoing diagnosis of the patient's condition" – were clearly distinguished as patient processes (Figure 2). According to the concept of dynamic BPM and Routine Dynamics (Table 1), in this case, the routine management of chronic disease takes into account "interdependent actions carried out by multiple actors, involving multiple actors" (Feldman & Pentland, 2003). As part of unstructured processes, the involvement of the patient and his/her relatives also becomes a new "routine" in healthcare and can have a significant impact on the value provided by the process.

The diagram in Figure 2 also shows the change in routine in the approach to diagnostics and therapy, as a result of the widespread use of new e-health technologies. The process of "Evaluation of the effectiveness of therapy" is carried out automatically, using telemedicine devices to collect and analyse patient data. Various digital solutions can be used for e-health such as Process Mining, Artificial Intelligence, Virtual Reality Systems, Information Feeds & Resources, Decision Support Systems, Data Transfer Systems, Screening ICT, Public Health Surveillance & Monitoring ICT, Professional HealthCare Actor ICT, Multi-Professional Health Actor Environment, and many others. It allows, without the involvement of a physician, to collect and analyse measurements of the patient's vital parameters specified in the Individual Plan of Care, and to automatically, as well as immediately react in the event of a threat to the patient's life (e.g. after detecting a fall in or loss of pulse). CPs Diagnostic and therapeutic process of COPD has been supplemented and remodelled as a result of the analysis of the possibilities and availability of devices, along with changes in social culture, accelerated by the COVID-19 pandemic.

Conclusions

This paper presents how the routine dynamics of the kiBPs are encompassed by the dynamic BPM. A look at RD in dynamic BPM (or, in other words, the inclusion of organisational routine dynamics in the awareness of dynamic BPM) allows for a more objective view on managing an organisation and overcoming more effectively the "routine" understood as mindlessly acting in the same way and passively waiting for possible new management decisions. The very high level of efficiency of the processes of modern organisations and the ease of copying solutions, based on hyper-automation of structured processes, make building a competitive position, thanks to the daily management of knowledge and the use of employee dynamics, a necessary condition, not only for competing but also the existence of enterprises in Industry 4.0/5.0.

The illustrative case studies shown in example 1, probably the most routine action in healthcare, such as medical consultation, always require taking into account the context of the process, and its course is unpredictable. It is possible to define the goal and general rules of conduct but organisational routine requires the recognition of the physician's empowerment to make decisions depending only on their knowledge and the context of the process. In other words, it is routine not to have a traditional routine.

Example 2 shows how in dynamic BPM the routine changes to include not just fragments, but a holistic view of the process carried out. This is possible thanks to the consideration of factors/reasons traditionally considered to fall outside of BPM,

such as the knowledge and commitment of all process participants. From this point of view, it is routine in healthcare to take into account the attitude and commitment of the patient and his or her relatives. In effect, we are dealing with an organisational routine that requires going beyond the organisation.

Dynamic BPM is a concept that includes and integrates the existing knowledge and at the same time allows you to predict the direction of changes thanks to correct recognition of their actual sources and drivers. What is important from a practical point of view is that the article is not limited only to the analysis of the observed results but indicates the sources (why?) and motivators (how?) of changes necessary to adapt BPM to the requirements of the business environment. This allows for a better understanding of the causes and course of the RD change processes. The article opens discussions and is an introduction to the study of organizational routine in processes requiring dynamic management. Future work will investigate how the broader view of dynamic BPM influences the understanding of Routine Dynamic.

The article is limited mainly by the use of illustrative case studies, which are often at a disadvantage in terms of replicability, generalisation, and reliability. In the future, additional research should be carried out to empirically confirm the theses formulated in this article.

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RUTYNOWA DYNAMIKA WIEDZOCHŁONNYCH PROCESÓW BIZNESOWYCH INTENSYWNYCH NA PRZYKŁADZIE SEKTORA OCHRONY ZDROWIA

Streszczenie: Celem artykułu jest omówienie koncepcji rutynowej dynamiki z perspektywy wiedzochłonnych procesów biznesowych. Tradycyjne podejście do procesów biznesowych zakłada kontrolę przepływu dobrze ustrukturyzowanych działań, które organizacja realizuje, aby osiągnąć swoje cele, oraz zarządzanie nimi nastawione na doskonalenie poprzez zwiększenie efektywności. Jednak w gospodarce opartej na wiedzy coraz większą rolę odgrywają wiedzochłonne procesy biznesowe, które są silnie uzależnione od osądu człowieka, a także aktualnej wiedzy, wymagającej częściowo ustrukturyzowanego i nieustrukturyzowanego podejmowania decyzji. Potrzebna jest do tego zmiana podejścia do zarządzania procesami i ich doskonalenia, a także wykorzystanie dynamicznego podejścia wykonawców procesów do kreowania wartości poprzez zastosowanie i tworzenie wiedzy podczas realizacji procesów. Aby zilustrować tę transformację, jako studium przypadku wykorzystano procesy z sektora opieki zdrowotnej, które ukazują ograniczenia tradycyjnego podejścia do zarządzania procesami i potrzebę przejścia na dynamiczne zarządzanie procesami. W efekcie zaprezentowano dwa modele procesów, wskazujące na potrzebę dynamicznego podejścia do zarządzania procesami zdrowotnymi jako sposobu na tworzenie i wykorzystywanie szybko zmieniającej się wiedzy oraz na wprowadzanie nowych technologii, które nie tylko zwiększają efektywność procesów (np. automatyzacja), ale przede wszystkim tworzą nową wiedzę i wykorzystują dane o pacjentach w czasie rzeczywistym.

Słowa kluczowe: dynamiczne zarządzanie procesami biznesowymi, zarządzanie procesami zdrowotnymi, ilustracyjne studium przypadku, wiedzochłonne procesy biznesowe, rutynowa dynamika