

Modelling of validation process with BPMN notation

Modelowanie procesu walidacji z wykorzystaniem notacji BPMN

Słowa kluczowe: zarządzanie procesami biznesowymi/edukacyjnymi (BPM), modelowanie procesów, notacja modelowania procesów biznesowych (BPMN), walidacja uczenia się formalnego i nieformalnego.

Streszczenie: Unia Europejska wspiera i koordynuje działania podkreślające wartość wiedzy, umiejętności i kompetencji nabytych poprzez uczenie się pozaformalne i nieformalne. Walidacja to kompleksowe działanie, które umożliwia sprawdzanie czy określone efekty uczenia się zostały osiągnięte i mogą zostać potwierdzone w procesie certyfikacji na potrzeby kariery zawodowej lub dalszej nauki kandydata.

W artykule podkreślono znaczenie zarządzania oraz modelowania procesów biznesowych, a w szczególności procesów związanych z edukacją jako fundamentalnego dla zrozumienia i doskonalenia rzeczywistych systemów biznesowych i organizacyjnych. Ze względu na rosnące tempo zmian, wciąż zwiększającą się niepewność i występowanie na nieznaną dotychczas skalę zdarzeń typu wild cards, procesy powinny podlegać nieustannej reinżynierii celem adaptacji do ewoluujących wymagań klientów. W artykule zaprezentowano również kwestie związane z zarządzaniem procesami biznesowymi (BPM) w odniesieniu do walidacji. BPM koncentruje się na usprawnianiu złożonych procesów, aby wspierać ich płynną i efektywną realizację. Skoncentrowano się na modelowaniu i wykorzystaniu notacji BPMN jako jednej z metod zapewniającej jednoznaczną formę interpretacji i prezentowania globalnych perspektyw walidacji uczenia się pozaformalnego i nieformalnego. W części empirycznej pracy w formule modelu BPMN przedstawiono m.in. obowiązujące wytyczne dla EU dotyczące walidacji wiedzy, umiejętności i kompetencji sformułowane przez *European Centre for Development of Vocational Training*.

Key words: Business Process Management (BPM), process modeling, business process modeling notation (BPMN), validation of formal and informal learning.

Abstract: The European Union supports measures to ensure the visibility and value of skills acquired through non-formal and informal learning. The validation process helps to bridge the educational inequalities, and offers further pathways for the development of skills and competences needed in life and in the EU labour market.

The paper points out the importance of the business process modeling as fundamental for modern systems (education, technology, business etc.) due to the increasing rate of change and uncertainty. As a result, business processes, educational in particular, need to be continuously redesigned and subsequently aligned with the corresponding information systems and customer requirements. Issues related to the Business Process Management (BPM) for validation are also addressed in the paper. BPM focuses on streamlining complex processes to help businesses run smoothly. It was therefore natural to think about using the BPM approach, and,

also using BPMN as the underlying method for common understanding and presenting the global perspectives on recognising non-formal and informal learning. In the empirical part of the paper, the BPMN model of recognition, validation and certification of competences that aims at creating the coherent system for validation was presented.

Introduction

The importance of education for the development of excellence and knowledge contributes directly to the social and economic development of a country (Drgana, Ivanaa and Arba, 2014). Ensuring the development in this direction involves understanding the mechanisms, which underlines the processes of skills developments and validation, but also the existence of a good strategy to achieve the performance especially within the European Union. People learn in multiple ways and in many different contexts outside of formal education and training structures, i.e. non-formal (normally structured learning e.g. in-company training) and informal (happens naturally as part of diverse activities (e.g. digital skills developed through leisure activities) (europa.eu, 2022). Despite this increasing interest, informal and non-formal activities are still underresearched, with most of their design decisions relying on the intuition of the expert or the instructional designer (Tisza et al., 2020). Presenting the BPMN model of this process might be a step forward to the deeper and consistent understanding of skills development and its recognition, validation and certification.

Business process management

The today world is characterized by so far unexperienced levels of wild cards events, complexity, and uncertainty. Business, education, technology and innovation systems that are able to adapt quickly to environment and changing conditions have a competitive advantage and are characterized as resilient. Business Process Management (BPM) and process modelling enable to implement changes effectively, and not only helps to improve the process, but also creates the flexible system that quickly reacts to change and recognises early warning signs.

BPM is rapidly proliferating as an emerging discipline in practice and in academia. Despite BPM being ranked as a top priority by organizations, Gartner studies have identified it as critical to business transformation success (Gartner, 2022). Properly defining processes, and then modelling, implementing, controlling and enhancing them, considerably improves both profitability and customer satisfaction, and consequently boosts the competitive potential (Bitkowska, 2020). Process management is a comprehensive concept that directs processes towards strategies and leads processes to higher efficiency and effectiveness securing sustained success through a planning and control system.

To efficiently manage a process of formal and informal learning, it is essential to understand not only the *steps* that are carried out, but also assets involved, such as *people*, the *information*, *procedures* and *official guidelines*. BPM does not

only deal with analyzing, designing, developing and executing business processes, but also with considering the interaction between these processes, controlling, analyzing and optimizing them (Morais, Padua and Costa, 2014). The optimization and alignment improve a particular product or service, by speeding up the business process in question (for example increases understanding, visibility and value of the knowledge, skills and competences validation), by making it more efficient and more customer-oriented. While the idea behind BPM sounds straightforward, many organizations, also educational systems, units, programmes, still do not focus on managing their end-to-end processes. Instead, their functional units act independently, with their own budgets, procedures, improvement programs, and IT systems. As a consequence, there is a huge *disconnect* between offered possibilities and real customer needs, and only integrated and coordinated business processes can ensure the creation of products or services in accordance to the needs of their consumers. The principal idea in BPM is to develop an organization geared toward processes by eliminating activities that do not add value and improve process fluency within the limits of organizational functions (Kujansivu and Lonqvist, 2008).

The recognition and validation of learning outcomes of non-formal and informal learning is a powerful tool to support the social inclusion and empowerment of people, especially those with limited opportunities to access and participate in formal education, and it gives visibility to skills and competences developed in different learning environments. The validation process helps to bridge the educational inequalities, and offers further pathways for the development of skills and competences needed in life and in the labour market (Solidar, 2022; Wiechetek, Medrek and Banas, 2017).

To make any impact on a process of competence validation, its recognition and improvement, it is fundamental to capture and characterize it; a description of a business process may serve as a starting point to set up performance measurement, to conduct a simulation study, to compare effectiveness and to improve. Therefore, the aim of the research is to underline the importance of modeling in validation improvement by presenting the main participants of this process, phases of validation and provide the model of selected processes based on business process modeling notation (BMPM).

Process modeling, BPMN notation

Although many organizations, business, sectors are involved in process improvement initiatives, only a small number of them follow a holistic vision and focus on the level of organizational processes (Neubauer, 2009). Modeling is established among those activities that comprise managerial practice in BPM, next to: planning, analysis, design and modeling, implementation, monitoring and control and refining. Different BPM life cycle models in the literature confirm the importance of the modeling stage, among others: (Van der Aalst, 2004), (Zur Muehlen and Ho, 2006), (Weske, 2007), (Hallerbach, Bauer and Reichert, 2008), (Verma, 2009), (ABPMP,

2009), (Houy, Fettke and Loos, 2010), (Bitkowska, 2013), (Bernardo et al., 2017), (Lamghari et al., 2018). Process modeling is described as the one the first steps taken by a business analyst when analysing a process, basis for an optimization and design and analysis that could be validated through simulations (Kijek, Brzeziński, Zolkowski, Gontarczyk, Rykała, 2017), an excellent initiative for the continuous improvement, and activity that gives measures for improvement. Process modeling gives a lot of important information input into process management. Examining a graphical description of a process, for instance BPMN, allows users to easily discover inconsistencies, discontinuities, differences in names or acronyms, infinite loops, non-terminating conditions and so forth. As modeling it is a fundament for analysis of business processes and process implementation – therefore this stage has been selected to present the information and resources flow in a competence's validation process.

In the last few years there is a clear need for a modeling language for business processes which could be expressive and formal enough but easily understandable also by final users and not only by domain experts. At the present, the state-of-the-art in the field is represented by BPMN (Business Process Model and Notation), the leading standard in the frame of business processes and workflow modeling languages. The BPMN is the de-facto standard for representing in a very expressive graphical way the processes occurring in virtually every kind of organization one can think of (Chinosi and Trombetta, 2012). BPMN is characterized by a very high semantic and syntactic complexity, resulting primarily from the use of IT notations requiring an appropriate level of detail to enable precise description of business processes in order to implement them in an IT system, especially in the case of modeling executable processes (Polak, 2015). It provides a notation that is intuitive to business users but is also able to represent complex process semantics (BPM Institute, 2022).

The primary goal of the BPMN effort was to provide a notation that is readily understandable by all business users, from the business analysts that create the initial drafts of the processes, to the technical developers responsible for implementing the technology that will perform those processes, and finally, to the business people who will manage and monitor those processes (Recker, 2012).

Nowadays, the contribution of informal and non-formal learning activities to lifelong learning is widely acknowledged, with the concepts of ubiquitous, everyday, and intuitive learning drawing the attention of both educational institutions and society (Tisza et al., 2020). The BPMN standard provides sufficient expressiveness to model various processes, and can also provide information describing the validation process and its stages.

Research method

Figure 1 provides an overview of the research methodology presented in the paper. Each step is described in further detail below.

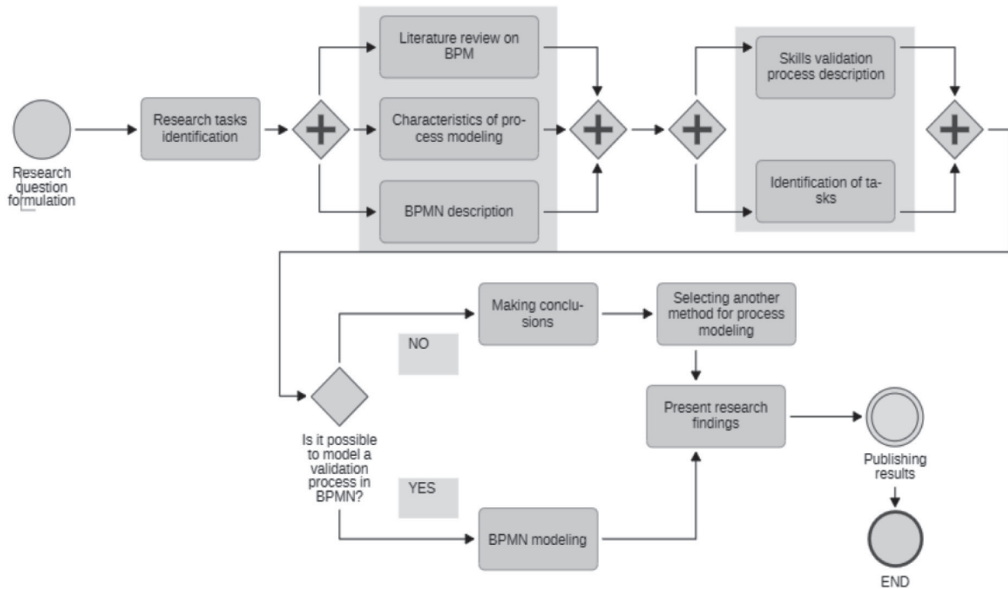


Fig. 1. Overview of research approach

The research question regarding possibility of using the BPM concept and BPMN notation to model the process of recognition, validation and verification of knowledge, skills and competences resulted in designing the research presented in the paper. First, a literature review was conducted; to describe the advantages of business processes management and its importance in process reengineering and efficient change implementation. The desk research that was carried out also concerned process modeling that facilitates the discovery of information needs within the system. BPM and BPMN are commonly used for business processes that have the following features: starting and end point for the series of steps, overall objective or reason why the process is performed, specific actions performed by team members, order in which steps are performed, individuals that perform the steps, the specific product, service or result that comes from executing the process, next process, requestor, or end-user of the outcome. Validation is a process of confirmation by a competent/authorised body that learning outcomes (knowledge, skills and/or competences) acquired by an individual in a formal, non-formal or informal setting have been assessed against predefined criteria and are compliant with the requirements of a validation standard (Unesco, 2022). This study is specifically devoted to proving the relevance of BPMN notation for modeling of validation process.

BPMN model of validation process

The main aim of validation is making visible the diverse and rich learning of individuals that takes outside formal education and training and is frequently

overlooked and ignored. Validating non-formal and informal learning is the key process that address the wide range of policy-makers and practitioners involved in developing and implementing validation. Validation is a complex process that requires the involvement of many different actors with different responsibilities and functions, such as: candidates, advisers/counsellors, assessors, the authority/awarding body establishing and operating validation arrangements in Europe.

The general structure of the validation process and the message flow to present communications between main participants was presented at Fig. 2.

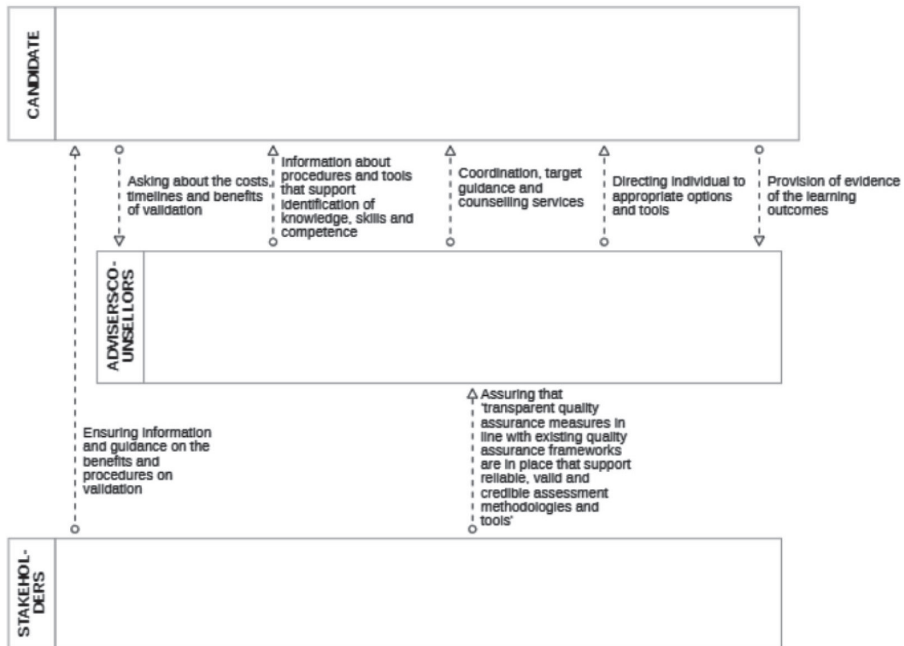


Fig. 2. The structure of a validation process

Participants are represented by pools (rectangles with a label), and message flows represent details of collaboration (i.e. how do they exchange messages) between participants. Diagram presents a general process outline and shows examples of communications exchanged between the process participants. The diagram does not follow the order of the message flow.

Validation is a complex process that requires the involvement of many different actors with different responsibilities and functions. Main stakeholders include European stakeholders, public national stakeholders, public regional and local stakeholders, education and training institutions, business sector.

Validation is a process that usually follows training and involves assessing an individual's knowledge and ability to perform job tasks, in the heart of this are

customers: candidates, students, adults, professionals etc. Definition of validation adopted in the paper is as follows: 'a process of confirmation by an authorised body that an individual has acquired learning outcomes measured against a relevant standard' (Council of the EU, 2012).

The As-Is diagrams presented in the paper describe the present state of the validation process on the basis of *European Guidelines for validation non-formal and informal learning*. The European recommendation identifies four phases of validation of an individual's learning outcomes acquired through non-formal and informal learning:

- Identification;
- Documentation;
- Assessment; and,
- Certification.

The BPMN model was presented at Fig. 3. The validation process necessarily starts with the identification of knowledge, skills and competence acquired within various ways, such as during work, at home or other activities. Documentation will normally follow the identification stage and involves provision of evidence of the learning outcomes acquired such as written documents, work samples, demonstrations of practice etc.

To ensure the overall credibility of validation of non-formal and informal learning in the next stage learning outcomes are compared against specific reference points and/or standards on the basis of written, documentary evidence or other forms of evidence. The final phase of validation is linked to the certification in the form of a qualification, or credits leading to a qualification (or in another form) and enables one to value the learning identified, documented and assessed in previous stages.

The next issue concerning the validation process is to design, develop and share appropriate tools for validation of non-formal and informal learning. Although experience of assessors and counsellors is key element in quality assurance, the tools capture various aspects of learning experiences, and also have a significant impact on the overall quality. Validation tools and methods should strive for clarity, precision and be as unambiguous and non-judgemental as possible (Council of the EU, 2012). The following tools, presented with notation, for extracting evidence are highlighted in the recommendation (Fig. 4).

The developed models of processes were elaborated from the validation perspective. The presented diagrams could be base for business process reengineering/improvement initiatives regarding processes of recognition, validation and certification of competences that aims at creating the coherent system for validation. Without a model, it would become very difficult to manage vast amounts of information in a coherent manner and come to any form of common understanding. Moreover, the capability to store information means that models

often provide a rich means of managing documentation concerns, by preserving the information for future referencing and possible reuse for other purposes.

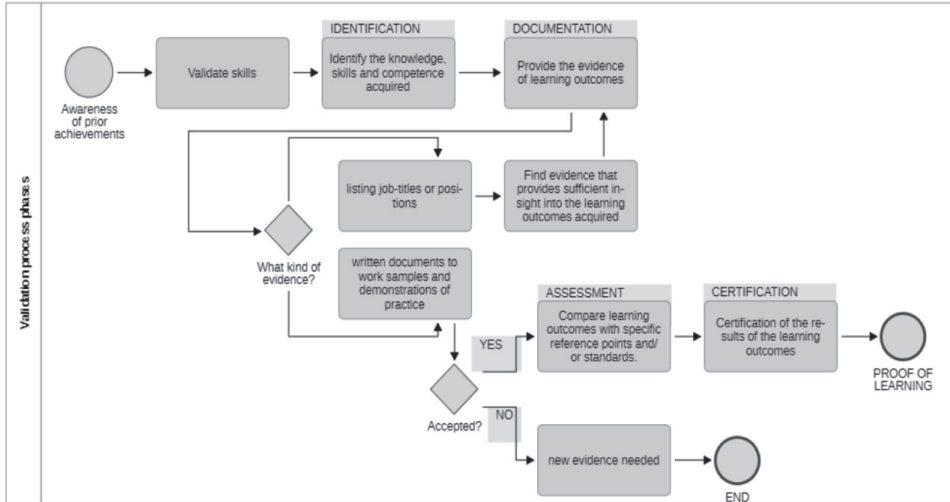


Fig. 3. The model of validation process with BPMN notation

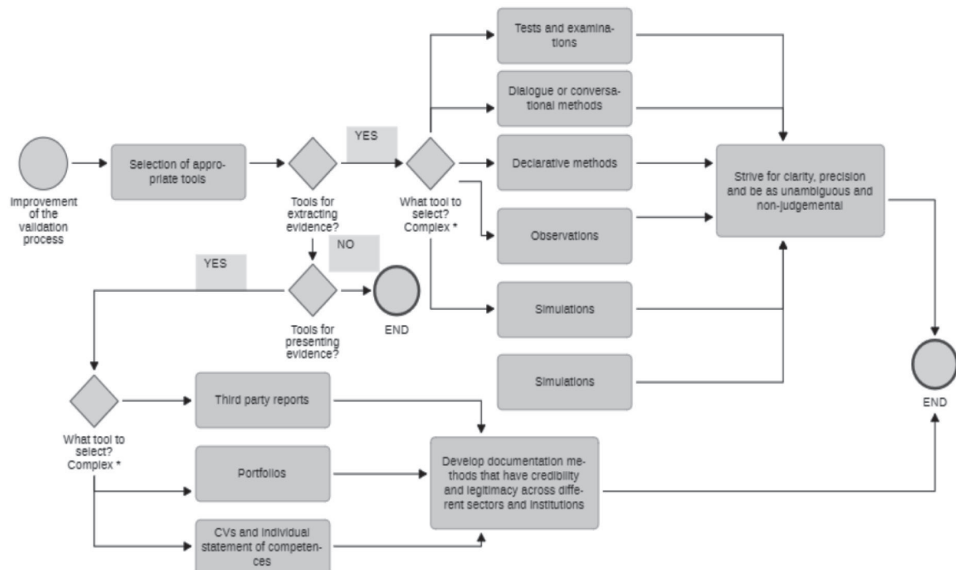


Fig. 4. Process of selection of tools supporting the validation process

Summary

In many countries the validation of learning outcomes of non-formal and informal learning is not widely promoted or understood, therefore, raising awareness of the

validation remains a challenge. BPMN notation *allows* for easier communication and collaboration in understanding the holistic process of validation of knowledge, skills and competences. Validation adds value and benefit for individuals, employers, education providers and society as a whole. Validation is also of major importance to skills supply in the labour market. By validating an individual's knowledge and skills, subsequent education and training can focus on filling any gaps to meet the requirements for the relevant qualification. Validation is thus also important for the efficient use of resources in the education sector. Contemporary validation system could use Business Process Management and process modelling in order to improve competitiveness, efficiency, flexibility, financial results or the quality of customer service, and the internal structure of processes.

Processes are merely ways of coordinating people, their skills, capabilities and behaviour with other people, systems and resources to drive the right outcomes of the non-formal and informal learning achievements. In a constantly changing environment, static and routine processes will not suffice. The BPMN notation used in the article is an effective tool for specifying validation processes, as it allows for continuous monitoring, control and analysis of processes. BPMN enables the description of processes in a way that is understandable to the recipient and their precise identification at the technical and application level.

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