
Occupational Risk Management on the Basis of Accident Scenarios in the Usage Chain

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Marcin Berlik¹, Małgorzata Sławińska², Jolanta Słonieć³

Abstract:

Purpose: Development of a tool for in-depth analysis of occupational risk, based on the identification of system relationships in the employee-intermediary device-machine chain of use, in order to ultimately achieve the improvement in the occupational safety for technological equipment operators.

Approach: Iterative algorithm identifying the task context factors, for the systemic management of occupational risk. Application of card techniques recording the course of activities performed by an employee during a shift, in order to recognize the phenomena accompanying a safety hazard situation within the workplace.

Findings: The standardized algorithm of obtaining, processing and sharing the information for task-related conditions, in a systemic approach. The operational information database extended with knowledge of factors, that are crucial for safe operation of a human being in the workplace. Designing the structure of the operational information database and resource control algorithms, in relation to the critical potential.

Practical Implications: The presented concept will enable the managers to perform an in-depth analysis of the work system and gain knowledge about the characteristics of the tasks performed, the accompanying threats, and thus to undertake rational improvement actions.

Originality/Value: A subjective evaluation of workplace requirements for the operational information database, that can be used in order to optimize the expenditures on the reduction of occupational risk in a given enterprise. Development of professional competences thanks to the cooperation of employees at particular positions during the creative research process perfecting the technical and organizational designs.

Keywords: Risk management, risk analysis, accident scenarios, safety of labour, human factor, usage chain, occupational risk, ergonomics.

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¹Poznań University of Technology, Faculty of Engineering Management, Poland, marcin.berlik@put.poznan.pl

²Poznań University of Technology, Faculty of Engineering Management, Poland, malgorzata.slawinska@put.poznan.pl

³Lublin University of Technology, Faculty of Management, Poland, j.slonec@pollub.pl

1. Introduction

Apart from employees' knowledge and skills, managers' competencies determine their effectiveness and any organisation's success, including family businesses. There are many studies on this issue (Cockerill *et al.*, 1995; Donckels and Lambrecht, 1999; Noordegraaf, 2000; Abraham *et al.*, 2001; Smith and Morse, 2005; Levenson *et al.*, 2006; Graves and Thomas, 2006; García Pérez de Lema and Duréndez, 2007; Johannisson and Huse, 2010; Mitchelmore and Rowley, 2010; Agyapong *et al.*, 2016. Vainieri *et al.*, 2019). However, it seems premature to say that everything has already been discovered in the competencies of managers.

The study aims to determine the primary areas of competencies that characterise the surveyed Polish managers. Next, the study seeks to determine what the primary determinant of shaping managers' effectiveness is? Finally, how do external factors influence competencies' rank, which creates an entrepreneurial competency framework?

The paper proceeds as follows. First, we review the previous research on managerial effectiveness and competencies. After that, the material and methods are discussed, followed by the study's results and conclusion.

2. Literature Review

2.1 Managerial Effectiveness and Competencies

Management performance is the extent and quality of managers' contribution to realising their objectives (Shirazi and Mortazavi, 2009). It has been observed that his competencies highly influence a manager's performance, and thus the success of an organisation depends upon managers' competencies to a great extent, competencies are a part of the theories that explain leadership effectiveness (Hogan and Kaiser, 2005).

In discussing the desired direction of changes in the formation of competencies categories, solutions used in different countries and various scientific disciplines are often referred. Contrasting examples of describing competencies in the form of tasks (competence) are used to identify competencies from a behavioural perspective (competency). Competency is understood as behaviours that an individual demonstrates. Competencies is defined as minimum standards of performance (Strebler *et al.*, 1997; Colombo and Grilli, 2005; Nuthall, 2006).

The presentation of competencies categories in the form of a description of specific functions or tasks is related to the expected results of actions subordinated to the work standards adopted in the organisation (Mansfield, 2004; Delamare *et al.*, 2005; Winterton, 2009; Gibb, 2014; Pikkarainen, 2014; Prifti *et al.*, 2017; Armstrong and Taylor, 2020). As a result, the competencies categories adopted in this sense should

be understood as a set of many components required to complete a specific task or achieve a desired outcome. On the other hand, according to the behavioural approach, the description of competence categories assumes that effective employees' specific characteristics are possible when commensurate with observable behaviours. Various variants of this approach were created to develop the desired outcomes of situationally determined action (Vaughan and Hogg, 2005). Therefore, a comprehensive approach to managerial competency requires to refer to competence categories described by behaviours, and not only oriented on tasks or quantifiable work results.

Competency categories are a multidimensional concept, which causes difficulties in its definition and classification. An attempt to diagnose competence categories in the form of a behavioural description proved that we are dealing with a kind of "black box" (Dubois, 1998; Straka, 2004). The tendency to consider competency as an issue with an unclear structure and endpoints is widely identified in the literature (Spencer and Spencer, 1993; Hockemeyer *et al.*, 2003; Stevens, 2013; Lounsbury *et al.*, 2016; Müller-Frommeyer *et al.*, 2017). There are some inconsistencies of interpretation exposed by authors representing various disciplines. The different understanding of competence categories is due to three main reasons:

- From the substantial variation in the description of competence categories across countries.
- From the interdisciplinary nature of management sciences, researchers representing different research backgrounds assign their own, very diverse and sometimes contradictory meaning to competence categories.
- Organisations dealing with human resource management create their constructs (often methodologically incorrect), instead of referring to already existing and empirically correctly diagnosed generalisations.

Competency categories became a distinct field of research when the American Management Association began initiating efforts to identify the desired behavioural outcomes in practical situations in which effective or outstanding employees become competent. As a result, a definition was created, which reduces the competence categories to a set of employees' characteristics, including skills, motives, personality traits, predispositions, and acquired knowledge (Boyatzis, 1982). It suggests that an employee's range of expertise expressed in specific competence categories should correspond to the particular position's requirements and the organisation's environment, thus enabling the assigned tasks' proper performance.

Competence categories presented above consist of behavioural determinants, the content of which is shown in the form of specific tasks and functions to be performed. One may argue, therefore, that the plane of describing competence categories should also be used with the analysis of tasks in the functional area (Hellstrom *et al.*, 2000; Beck, 2003) because:

- They are associated with a specific place occupied by the employee in the company.
- Competence expectations and requirements from the company and the external environment are put forward towards the employee.
- The way of fulfilling the employee's function is an expression of adjustment to competence requirements.

A similar approach has been adopted in the United Kingdom. Companies have introduced competence categories into their management system, containing lists of qualities, values and personal characteristics required from employees and ensuring high work efficiency (Le Deist and Winterton, 2005). They made it possible to use a uniform, integrated set of decision-making criteria in all processes belonging to the broadly understood human capital management area.

The content of reflections on the meaning of the category of competence in the French literature, in turn, highlights the need for a statutory formalisation of the balance sheets of professional achievements of employees. The proposals aim to present new categories characterising an employee's individual features in the aspect of his/her competences, taking into account the acquired knowledge, skills, and experience. In the version proposed by Couleta (2010), competence types include the knowledge, experience, attitudes, and skills necessary to adapt to changing operating conditions. The patterns of importance ratings of managerial competencies in France were also explored by Clark *et al.* (2016). Polish researchers (Talik *et al.*, 2012; Szczepańska-Woszczyzna and Dacko-Pikiewicz, 2014; Wudarzewski and Wudarzewski, 2018) do not differ significantly in their generalisations from researchers' theories from the countries mentioned above.

While managers' patterns are highly embedded in national institutional contexts, globalisation's phenomenon showed an inevitable erosion of national models due to non-national top managers (Davoine and Ravasi, 2013).

2.2 Managerial Competencies: Interdisciplinary Perspective

As noted above, competency categories can be considered from different disciplines: praxeology, psychology, law, sociology, and management. The praxeological approach focuses on enabling employees to act effectively, economically, reliable, and transparently. To the set of proposals defining the categories of competence with a high degree of formality and at the same time generality belongs the concept developed by lawyers. By competence categories, they mean the specific range of powers, authority, duties and responsibilities assigned to a job position and required in practical operation (Nordhaug and Gronhaug, 1994).

Sociologists highlight the aspects of raising awareness of different social groups about career patterns. In psychological terms, competency categories focus on the various mental dispositions required for a given job, which help characterise the

worker and explain the variability in their behaviour while performing tasks (Rubin *et al.*, 2007). The attempt to diagnose competence categories is also noticed in the management literature.

In this understanding presented by Seemiller and Whitney (2020), competence categories are represented by knowledge, skills, motivations, attitudes, and employees' behaviours. Similar is the meaning of the given term, according to Hays (2020). Marrelli (1998) conception, who systematised the views, should also be considered valuable. The researcher stated that competence categories include observable and measurable resultant of knowledge and skills, acquired, mastered and applied in practice, and used by the employee to solve a professional problem.

Armstrong and Taylor (2020) focus their understanding of competence categories on abilities, personality traits, and acquired knowledge and skills to lead to the enterprise's assumed mission's thoughtful execution. Northouse (2018) uses the assumption that people who have the right psychophysical features or act appropriately perform well in any situation. According to the model proposed by Havaleschki (1999), one should focus on those components of competence, the possession of which is related to success. In the model, called "Head, Heart, Legs," the researcher proposed sixteen components of competence, divided into three groups, depending on situational demands. In this model, one may identify some similarities to motivation theories, well-known in management sciences.

Competency requirements for employees can provide an impetus to diagnose them on empirical and scientific grounds. However, this is not a simple task. On the one hand, numerous examples are describing an employee's competency profile. On the other hand, there is individual freedom in interpreting the competency behaviour of people who play specific professional roles. It is because the identification of competence categories encounters significant difficulties:

1. individual components of competences change over time,
2. the flexibility of competences has a priority character,
3. similar tasks are carried out in different ways using different competences,
4. the situation determines individual competence categories.

The analysed definitions of competence categories expose the employee's predispositions expressed by a required set of behaviours, the mastering of which makes the action effective in a specific situation. On this basis, one may generalise that the competence categories are arranged in a three-factor structure. The first factor is related to operability, as the types of competence can only be applied to the effects of actions. The second factor is adaptive, as it includes adapting and acting effectively in a given situation. The last element combines the different components of the competence categories dynamically. Knowledge and personality traits enable managers to adapt to the changing environment.

3. Material and Methods

The study aims to determine the primary areas of competencies that characterise the surveyed Polish managers. Next, the study seeks to determine what the primary determinant of shaping managers' actions is? Finally, how do external factors influence competencies' rank, which creates an entrepreneurial competency framework? The above assumptions allow us to formulate the following hypothesis. Environmental and situational dependence of managers' competencies influences an entrepreneurial competency framework, enhancing their conceptual and relationship competencies.

The study was conducted in 2019-2020. One hundred forty-two managers from private firms from Western Poland participated in the study. They managed eight enterprises of the industrial and service sector. The results were prepared for the whole set of the surveyed persons, without division into subsets identified in individual companies. A questionnaire, non-structured interviews enriched with literature study were used for the research. Due to Poland's legally protected enterprise secret, the article does not provide the analysed companies' data.

4. Research Results and Discussion

The analysis showed that the external environment was the primary determinant shaping managers' actions (the questionnaire considered the external environment, internal determinants, and managerial staff was further distinguished). Therefore, this fact indicates the high rank of situational dependence of executive personnel competence categories on the environment's influence. The relationship's percentage distribution shows that 66% of analysed managers identified the external environment as the primary variable determining competence categories. 21%, pointed to managers' inspirational role in shaping elements of the situation in which they operate. The research results also showed that 13% of the respondents identified the source of changes within the competence categories as internal factors.

The study identified three areas of competence categories. The first includes skills and psycho-physical traits; the second contains responsibilities and authority, and the third contains motivations and behaviours. In further analysis of the competency categories describing managers, it was found that the environment determined these areas respectively. The relationships considered above show that 51% of managers believe that the organisational environment influences competence categories, including skills and personality traits. In contrast, 37% of respondents identified environmental influences with motivations and behaviours. However, in the case of rights and duties as factors of the structure of competence categories subject to the external environment's impact, the percentage distribution was 12%.

Based on research, the entrepreneurial competency framework includes entrepreneurial competencies, business and management competencies, human

relation competencies, and conceptual and relationship competencies. The surveyed managers assessed their competencies on a 5-point Likert scale. Conceptual and relationship competencies (7 competencies) should be mentioned among the most considerable competencies they set in themselves. Then business and management competencies (5 competencies). And finally, entrepreneurial competencies (4 competencies) and human relations competencies (4 competencies). However, if someone considers the five highest-rated individual competencies, then entrepreneurial competencies prevail, and only conceptual and relational competencies (Table 1).

Table 1. Summary of the average results of the competencies category structure (according to a 5-point Likert scale)

| the competence category | assessment of competence category |
|--|-----------------------------------|
| Recognising and envisioning taking advantage of opportunities | 4,62 |
| Organisational skills | 4,35 |
| Development of the organisational culture management feel is necessary to guide the firm | 4,35 |
| Management skills | 4,13 |
| Formulating strategies for taking advantage of opportunities | 4,12 |
| The ability to motivate others individually and in groups | 3,76 |
| The ability to implement the strategy | 3,73 |
| Mental ability to coordinate activities | 3,73 |
| Leadership skills | 3,69 |
| Interpersonal skills | 3,62 |
| Logical thinking skills | 3,42 |
| Goal-setting skills | 3,37 |
| Oral communication skills | 3,16 |
| Environmental scanning | 3,15 |
| Conceptual competencies | 3,12 |
| Idea generation | 3,08 |
| Business operational skills | 2,91 |
| Analytical skills | 2,83 |
| Delegation skills | 2,39 |
| Management style | 2,22 |

Source: Based on own research.

5. Conclusion

This study confirmed Smith and Morse (2005) arguments that managerial and entrepreneurial competencies are thought to be multidimensional constructs. The research conducted indicates that the external environment is the primary factor influencing the shape of competence categories representing Polish managerial

personnel. It confirms the results of Shirazi and Mortazavi (2009) that found that responsiveness and proactiveness are essential in managerial effectiveness. To a small extent, the conducted study revealed the importance of internal factors affecting the competencies. The research confirmed (Davoine and Ravasi, 2013) findings of globalisation's effect on managerial competencies. These competencies can be grouped into categories defined in studies Mitchelmore and Rowley (2010).

Polish managers pointed out entrepreneurial, conceptual and relationship competencies as a most possessed by them. The study confirmed Lerner and Almor (2002) findings that managerial skills and entrepreneurial skills should be considered as different factors. Business employees now operate in an uncertain environment, more so than before the COVID pandemic - 19. The pandemic environment's current changing conditions have redefined the requirements for the different competency categories of managers. The study was conducted before the COVID - 19 pandemics occurred. Therefore, one may assume that the content of managers' competencies in conditions of increased uncertainty caused by the pandemic will still strongly correlate with the management's vision, which requires managers to be more flexible in responding to the variability of operating conditions. Managers who treat flexibility as the foundation for adapting to change are less likely to find themselves in crises. Further research should aim to determine how Polish researchers use weak signals and black swans in managing uncertainty (Dobrowolski, 2020).

The authors have assumed that preliminary research shows the managerial competencies in a small group of Polish managers. Thus, the authors need to show modesty towards the generalizability of findings and encourage future researchers to tests whether research findings hold in different firms and countries.

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