

# The author's software system for planning and selection of personnel in SME

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**Abstract:** The strategic management of intellectual capital involves rethinking how the companies creates value from a knowledge-centric perspective and redesigning and orchestrating the role of staff knowledge in the firm's strategy. This paper presents the author's software system for facilitating decision making at a strategic level in terms of the profitability of investment in staff knowledge. This software is a computer implementation of the method for planning and selection of personnel in SME.

**Keywords:** intellectual capital, strategic knowledge management

## 1. Introduction

The advantage of a company in the SME sector (small and medium sizes enterprises) is determined by effectiveness and the extent of the knowledge-workers' involvement. The role of intellectual capital management consists in striving to increase the share of immaterial resources (at the costs of the material ones) in the generated products, services, and the total market value of an organization (Król and Ludwiczynski, 2007).

To manage of intellectual capital more systematically, the firm must devise an agenda for transforming from an organisation simply comprising knowledge able individuals to a knowledge-focused organisation that stewards the creation and sharing of knowledge within and across internal business function and that orchestrates the flow of know-how to and from external firms.

Many studies have focused on knowledge management strategies and methodologies from an organizational perspective (Barthelme *et al.*, 1998), (Basu, 1998), (Carayannis, 1998), (Drew, 1999). Many useful studies on the development of information sharing systems and collaborative tools to support intra-organizational processes and teamwork also exist (Chen and Liang, 1999). However, both the methodology and software system functionality for knowledge management are highly dependent on the process characteristics and the knowledge involved.

The competitive advantage of companies, especially SMEs, decide to increasingly knowledge and innovation potential. Knowledge is a broad concept, embracing both the knowledge formalized (explicit) and non-formal knowledge (hidden). Looking at the relationship between data, information, management information and knowledge (Senn, 1990) should be regarded knowledge as a strategic resource company. Application of information

systems that support knowledge management in SMEs can give guarantees a constant competitive advantage in the market.

The article presents the description of strategic knowledge resources in companies and author's method for planning and selection of personnel in SME (see section 2). In the third chapter the author's software system for facilitating decision making at a strategic level in terms of the profitability of investment in staff knowledge is presented on example of the decision-making situation in which an innovative SME is considering the employment of a new  $m$ -th employee. The summary shows the directions of the further work.

Author's method for planning and selection of strategic knowledge resources in SME

While resources are important to the performance of a firm, according to a resource-based view, whether or not an organization gains a competitive advantage and any associated returns, depends on the strategic planning used to leverage those resources (Chrisman *et al.*, 2003); (McGrath and MacMillan, 2000).

The need to describe a strategic-knowledge resource was motivated by the concept of resource management (Sirmon and Hitt, 2003), as well as competence management (Berio and Harzallah, 2005) – see Fig. 1:

So, the following personnel SME usefulness function  $W_{nm}$  for the  $m$ -th employee in the SME is proposed:

$$W_{nm} = f_1(\mathbf{GK}) + f_2(\mathbf{PK}) + f_3(\mathbf{A}) + f_4(\mathbf{E}) + f_5(\mathbf{P}) + f_6(\mathbf{C}) + f_7(\mathbf{R}),$$

where:  $n, m \in \mathbb{N}$ ,

The linear form of this function  $W_{nm}$  is chosen because all elements are independent and equally important to assess the effectiveness and efficiency of investment in knowledge. It is possible to receive indispensable data for account of value personnel usefulness function from companies belonged to reference model of SMEs (Patalas-Maliszewska, 2009) by an interview in each enterprise. Each employee should complete the questionnaire. On the basis of an algorithm for testing solutions for each employee it is possible to receive a specific value of the personnel usefulness function and each of the parameters of this function.

A four-element method for the planning and selection of strategic knowledge resources in SME has been built. The four elements are:

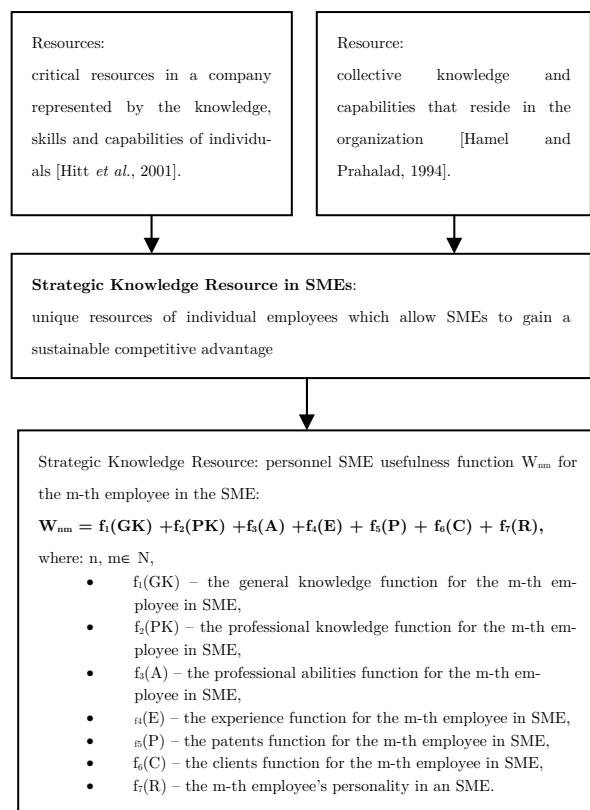
- A reference model of an SME-sector company,
- The value of the personnel usefulness function for each  $m$ -th employee in SME,
- The qualifying criteria in an innovative company,

- An algorithm which will enable the connection of the value of strategic resources of knowledge to the value of the qualifying criteria for an innovative company – GMDH.

The method was created on the basis of methods for the assessment of capital value and on the characteristics of innovative companies. It combines available knowledge gained from literature, and experiences of SMEs which have the potential for innovation.

The method allows for making an assessment of the future value of the decision about the selection of an employee in the relation to increasing innovation in a SME-sector company.

The next chapter presents the author’s software system for facilitating decision making at a strategic level in terms of the profitability of investment in staff knowledge, which considers all elements of the presented method.



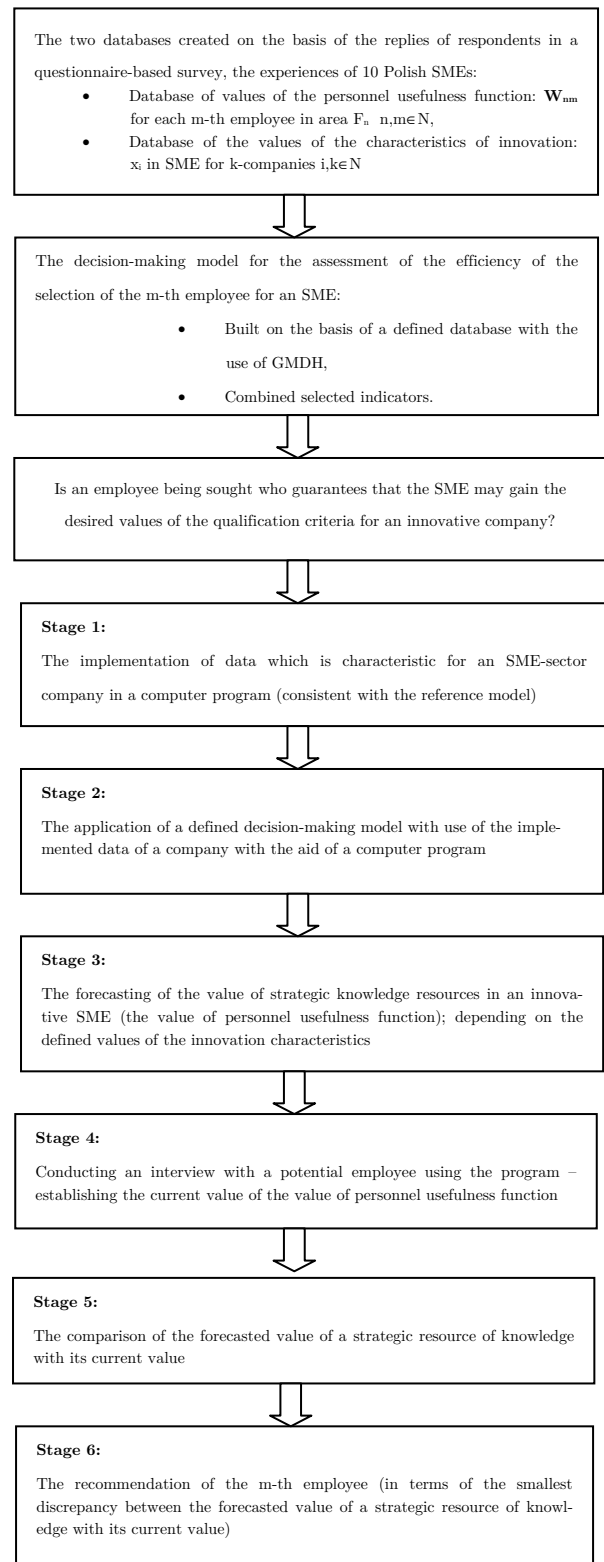
Rys. 1. Określenie strategicznych źródeł wiedzy w systemach MPS

Fig. 1. Definition of strategic-knowledge resources in SMEs

## 2. The author’s software system for facilitating decision making at a strategic level in terms of the profitability of investment in staff knowledge – example of using

The decision regarding the selection of an appropriate employee requires the company management to assess the efficiency of this investment. The application of the model makes it possible to obtain a forecast of the value of the strategic knowledge resources within a given organisation.

The decision-making situation, in which an innovative SME is considering the employment of the m-th employee, is presented in the diagram:



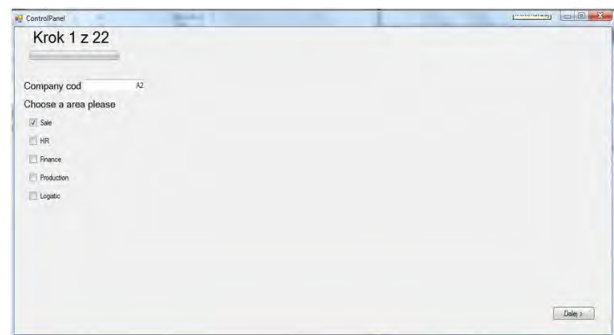
Rys. 2. Sytuacja podejmowania decyzji, w której innowacyjny MSP zastanawia się nad zatrudnieniem nowego m-tego pracownika

Fig. 2. The decision-making situation in which an innovative SME is considering the employment of a new m-th employee

The decision-making situation of the SME sector has been presented; this decides on the employment of new employees in sales. Also the author has described the example of the company A2, which is looking for an employee to fill the position of 'regional assistant'. The company expects to retain its current level of innovation.

**Stage 1:**

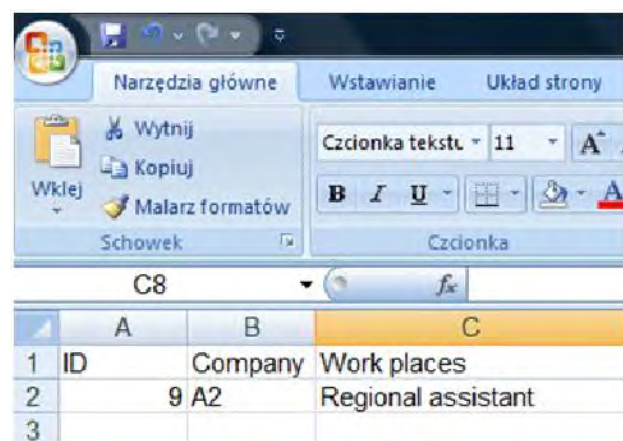
Using the proposed system, it is possible to check to see whether the company complies with the specified reference model. A potential new employee selects actions that will be performed in the company. The developed reference model will help companies to determine the work place for a new employee.



**Rys. 3.** Przykład użycia oprogramowania Autorki  
**Fig. 3.** Example of using the author's software system



**Rys. 4.** Przykład użycia oprogramowania Autorki  
**Fig. 4.** Example of using the author's software system



**Rys. 5.** Przykład użycia oprogramowania Autorki  
**Fig. 5.** Example of using the author's software system

**Stage 2:**

Through the use of the tool known as the system to support decision making at the strategic level with regards to the assessment of knowledge in an innovative SME, which is the implementation of the method for planning and selection of personnel in SME, the following information was produced:

For  $m_4$  – Regional Assistant:

$$m_4^* = -0,6490 + 3,4592X_7 - 2,2539X_{13} - 2,0984X_7^2 + 1,7486X_{13}^2 + 3,8323X_7X_{13},$$

where

$X_7$  - number of employees with scientific degrees,

$X_{13}$  - the number of purchased and used licenses.

**Stage 3:**

For the new potential employee as a 'Regional Assistant', by using the decision model we obtain the following forecast of the personnel usefulness function, the company's request for the sample of A2's values of characteristics of innovation:

$$m_4^* = -0,6490 + 3,4592X_7 - 2,2539X_{13} - 2,0984X_7^2 - 1,7486X_{13}^2 + 3,8323X_7X_{13},$$

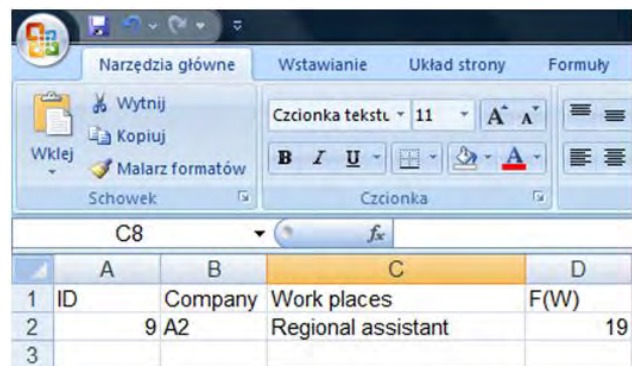
where

$X_7$  - number of employees with scientific degrees,

$X_{13}$  - the number of purchased and used licenses.

**Stage 4:**

Using the the author's software system, the actual value of the personnel usefulness function for a new employee is checked (see Fig. 6):



**Rys. 6.** Przykład użycia oprogramowania Autorki  
**Fig. 6.** Example of using the author's software system

**Stage 5:**

Then we compare the actual value of the personnel usefulness function with the expected new employee. If these values are similar, it is assumed that the employment of the employee will allow us to maintain the current level of innovation within the company.

The actual value of the function:  $Wm_4 = 19$

The forecast value of the function:

$$Wm_4^* = -0,6490 + 3,4592X_7 - 2,2539X_{13} + 2,0984X_7^2 - 1,7486X_{13}^2 + 3,8323X_7X_{13} = 19,6231$$

for

$X_7$  – number of employees with scientific degrees –  $X_7 = 2$ ,

$X_{13}$  – the number of purchased and used licenses –  $X_{13} = 1$

The company can decide to recruit new employees for the position of 'Regional assistant' because the predicted value of the personnel usefulness function for the new employee is in line with the actual value of the function, which would allow the company to maintain a certain level of innovation.

### 3. Conclusion and direction for further work

This paper presents the author's system for supporting decision making at the strategic level with regards to the assessment of knowledge in an innovative SME. Through the example of using this system, the author shows how the forecasting of the values of strategic knowledge resources (values of the personnel usefulness function for the m-th employee) will be carried out. The current state of advancement of research allows the application of this system for SME sector in line adopted reference model (the reference model of SME is strictly defined in the other works of the author). The selection of employees using the proposed system is characterized by objectivity, methodical and uniformity, fairness and impartiality, professionalism.

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#### Autorski system informatyczny wspomagający podejmowanie decyzji w zakresie planowania i doboru personelu w MSP

**Streszczenie:** Strategiczne zarządzanie kapitałem intelektualnym w przedsiębiorstwach, w szczególności w sektorze MSP, wymaga właściwego postrzegania wartości wiedzy oraz pracowników wiedzy. W artykule przedstawiono autorski system informatyczny wspomagający podejmowanie decyzji w zakresie planowania i doboru personelu w MSP. System ten stanowi implementację autorskiej metody planowania i doboru personelu w MSP.

**Słowa kluczowe:** kapitał intelektualny, strategiczne zarządzanie wiedzą

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Dr nauk ekonomicznych, trener REFA, Akredytowany Konsultant Funduszy Europejskich z 8-letnim doświadczeniem. Specjalizuje się w: zarządzaniu strategicznym oraz opracowywaniu strategii rozwoju dla przedsiębiorstw, zarządzaniu wiedzą, zarządzaniu projektami. Stypendystka międzynarodowych stypendiów naukowych (m.in. w ramach 7 PR UE, MNiSW). Ma na swoim koncie liczne prace i publikacje. Prowadzi wykłady i zajęcia na uczelniach wyższych w Polsce i za granicą (Uniwersytet Zielonogórski, BTU Cottbus, Uniwersytet Techniczny w Wiedniu, Austria).



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