

Factor analysis of competence management practices: Case of Tunisian companies

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ABSTRACT

The concept of competence has recently been a hot topic in science management, particularly human resource management. However, most of the studies conducted on this topic have mainly been theoretical. Thus, the present study aims to operationalize competence management through the construction and validation of a questionnaire intended for Tunisian project managers. To this end, a quantitative study is conducted among 156 respondents. The principal component analysis and Cronbach's alpha calculations were used to ensure the validity and reliability of the factor structures. The results of the factor analysis confirm the existence of a measurement scale of competence management that comprises five independent dimensions, namely recruitment, assessment, training, compensation, and career management. This study provides project managers with a measurement instrument that can be used to analyze competence management practices in their companies so that they can develop and enhance their employees' skills.

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Introduction

The new challenges of the economic environment and the development of new technologies have forced companies to rethink their business models towards more flexibility and responsiveness. This new context led to the emergence of the concept of competence (Zarifian, 1988) which has recently gained momentum in the literature of science management, especially human resource management (Delobbe et al., 2014; Bouteiller and Gilbert, 2016). The introduction of this concept in the management of companies has changed the role of employees and work organization (Delobbe et al., 2014). It has thus become the sign of rupture with the organization of scientific work (Zarifian, 2002). Henceforth, the managerial debate developed around the concept of competence requires the renewal of human resources management and the enhancement of employees involvement in their tasks (Sassi and Ben Aissa, 2016).

Most of the studies conducted on the concept of competence have mainly been theoretical. A review of the literature on the concept of competence shows that it has rarely been approached from the angle of a quantitative approach (Igalens et Scouarnec, 2001; Klarsfeld, 2006; Colin and Grasser, 2006). However, such an attempt to create a measurement scale for competence management is difficult to implement. According to Hedhili and Boudabbous (2018), the difficulties are linked not only to the fact that the concept of competence escapes any attempt of precise definition but also to the lack of universal instrumentation allowing the operationalization of competence management. Because of these difficulties, Hedhili and Boudabbous (2018) state that studies which tried to solve the problem of measuring competence management present divergent results on the diffusion of its practices in companies.

Among the few studies that have attempted to measure the concept of competence quantitatively, Igalens and Scouarnec (2001) chose employee perception to develop a multidimensional measurement scale for competence management. Inspired by this measurement scale, we attempted to validate this instrumentation in the Tunisian context. Hence, the present study aimed to operationalize

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competence management through the construction and validation of a questionnaire intended for the Tunisian project managers. To this end, this study is based on a quantitative approach, realized via a questionnaire that was carried out within Tunisian companies working in different business sectors. The present study opted for project managers who have a clear understanding of competence management practices within their companies. The structural validity and reliability of the measurement scale were assessed through the principal component analysis and Cronbach's alpha calculations.

The relevance of this article is outlined at both the theoretical and practical levels. Theoretically, this study aimed to enrich the literature review on the concept of competence. It particularly focused on studies dealing with human resources management in competence management. On a practical level, it aimed to provide project managers with a measurement instrument that can be used to examine the different practices of competence management in their companies. This instrumentation allows the company to better adapt to its environment through the development and enhancement of its employees' competences.

This study consists of four parts. The first part illustrates the main theoretical studies that emphasize the importance of the concept of competence and competence management. The second part describes the research methodology. The third and fourth parts are devoted to the analysis and discussion of the results, respectively.

Literature review

The emerging context of competence

The concept of competence constitutes a new model of management that allows the company to adapt its resources to the new requirements of the business environment (Dietrich et al., 2010; Defélix and Sanséau, 2017). Indeed, the emergence of the concept of competence is the result of economic, technological and organizational changes (Hedhili and Boudabbous, 2018).

Since the 1970s, the production of standardized goods and services has become unable to meet the new expectations of the contemporary market (Mirallès, 2007). The globalization of the economy and the increased demand have led companies to rationalize their management methods towards demand-driven production and mobilize responsibility among employees within the working group. Therefore, the company must have competent employees to anticipate and meet the new expectations of its customers. In an environment of autonomy and initiative, the employee is no longer confined to execute predefined tasks at the workplace but must adjust to unforeseeable events (Mirallès, 2007). The aim of the company is thus to reconfigure its production processes to best meet the needs of its customers (Pesqueux, 2002); thereby improving its productive profitability. Companies must adopt a core strategy that accentuates the development of their employees' competence (Ségal, 2009).

At the same time, major technological changes, particularly the use of process automation and computerization, have modified the role of the human factor within companies (Dejoux, 1999). In this context, Stroobants (1993) states that the employee is not a performer of a task but an operator who masters uncertainties, who solves problems and even manages projects. Since the late 1970s, the development of new information and communication technologies has led to the reorganization of the company's activities. This has accentuated the demand for new competences: qualified workers are no longer sufficient to cope with the reality of unpredictable work situations. Hence the need to adopting a new management model based on competence development to master and enhance these technological changes (Kerlan, 2012).

Since the 1980s, new organizational configurations have emerged, calling into question the monovalence and work specialization in favor of broadening of tasks and valorization of versatility enhancement. Indeed, the crisis of the Taylorian model has led to the emergence of the concept of competence that has become the symbol of a new management model (Zarifian, 1999). It goes beyond the organization of scientific work which fails to guarantee the new production requirements. The company must respond to the increased needs of its employees, particularly autonomy and recognition to facilitate individual involvement in the work and to channel professional mobility. Following the development of the competence concept, the new organizational models give the employee more autonomy and responsibility (Michaux, 2007). The employee is no longer a simple executor of repetitive and standardized tasks, but an actor who relies on the good management of the unforeseeable (Michaux, 2007). The employee must manage his/ her competences portfolio to meet the current expectations of the labor market (Igalens and Scourarnec, 2001).

The analysis of the economic, technological and organizational changes of the competitive business environment highlights the growing importance of the concept of competence in the renewal of business management methods towards greater flexibility and responsiveness (Sassi and Ben Aissa, 2016).

The concept of competence

Although the concept of competence plays an important role in organizations, it still has no precise definition (Hedhili and Boudabbous, 2018, 2020-1). According to Durand (2015), the concept of competence is defined as a set of knowledge, skills and attitudes that are manifested in the performance of a job in a real work situation. First, knowledge is represented through the acquired diplomas and professional training essential for the implementation of a certain task in a work situation. Second, skills relate to the experience and the operational capacities of the individual which correspond to the ability to act concretely according to a relevant adjustment process and deal with complex situations. Finally, attitudes cover specific behavioral knowledge and interpersonal skills that serve the success of the employee in the accomplishment of certain tasks within the company.

Although this primitive acceptance of the concept of competence, as the combination of a reduced number of general skills, is the most common in the literature, it is widely criticized (Loufrani-Fedida and Saint-Germes, 2013). Indeed, some researchers (Zarifian, 1999), consultants (Le Boterf, 1995) and industrial organizations (MEDEF, 1998) presented more advanced definitions of the concept of competence. According to Le Boterf (1995), competence is not limited to the addition of skills but is presented as an active process that allows the mobilization and coordination of different skills to achieve a predefined objective. These mobilized skills are not required to simply apply the rules but to manage complex professional situations and solve specific problems. According to MEDEF (1998), competences should be described, assessed and managed in real work situations. It is therefore up to the company to validate these competences. Zarifian (1999) proposed a more comprehensive approach to this concept in which competence is not only a simple application of skills in a real work situation but also taking initiative and responsibility and incorporating other values, such as sharing and pooling among members of the work team.

Competence management

Over the last few decades, competence management has been the subject of an abundant literature in science management (Hedhili and Boudabbous, 2020-2). Indeed, it is defined as "a set of activities aiming at optimally exploiting and developing the competencies of individuals and groups with the aim of achieving the company's mission and improving employees' performance" (Van Beirendonck, 2006, p.33). Defélix et al., (2008) suggest that it is difficult to formalize a unique model of management competence. Thus, four configurations of competence management were proposed in Defélix (2003):

- **Linguistic configuration:** *Competence management is based more on the normative discourse of the company's direction. There are no significant tools and practices. In this context, the company announces that it manages competences, but the available instruments and employees are unable to change the traditional practices of human resources management.*
- **Exploratory configuration:** *The company relies on its traditional instruments focusing on the current and future job positions. Competence management becomes formalized and guided by the human resources function.*
- **Confrontation configuration:** *Several competence management practices are involved in the human resources function (recruitment, assessment, training, etc.), while other practices remain unchanged (compensation). Although the company assesses the level of gaps between required and acquired competences, compensation is still determined according to the job title and position.*
- **Integration configuration:** *The company is no longer content to remain at the stage of the articulation of required and acquired competences, but also covers competence-based compensation. This configuration requires a willingness of the company's management because it presupposes exceeding the job title and seniority.*

These four configurations show that the degree of involvement of competence management practices seems relatively different from a company to another. This typology does not establish a normative path where companies will necessarily have to go through each configuration. Aubret et al., (2005) affirm that managers' discourses about changing such a vocabulary around the concept of competence are not sufficient to measure the integration degree of competence management practices in the company's business operations.

Recently, competence management has become a key lever in the field of human resource management (Delobbe et al., 2014; Bouteiller and Gilbert, 2016). Defélix (2003) considers competence management to be an extension of the traditional human resource management model. This extension can be broken down into three levels of human resource management. First, the acquisition of competence requires that a company seeks to specify the desired competences from its employees, but also to develop the new competences which it will need. Next, the stimulation of competence refers to the assessment and compensation systems that value and recognize competences. Finally, the regulation of competence consists of establishing strategies for the development of individual and collective competences in order to meet the needs of the company and its employees.

The aim of competence management is to replace the function of human resources management, articulated around the job title and position, with a new model of management that places the individual at the center of gravity of the organization (Defélix et Retour, 2008). Consequently, competence management aims to profoundly renew the content of the human resources function as well as its processes, roles and methods (Ughetto, 2014).

Competence management is based on a set of human resources policies that plan to manage the individual's professional career in the company, including recruitment, assessment, training, compensation, etc. (Ben Aissa and Sassi, 2013). Competence management is not limited to integrating the concept of competence into human resources practices but presents a new approach to management that brings about profound changes within these practices (Scouarnec, 2000). Grimand (1996) identifies five elements that describe the content of competence-based human resources management: new recruitment standards; strong valorisation of mobility; emphasis on responsibility, mobilization of relational skills in workplace judgments; encouragement of continuing education and crisis in established classification systems. Nevertheless, Scouarnec (2000) proposes to add compensation policy as a sixth element. Although compensation is still limited in the competence management approaches (Gilbert, 1994), it provides a greater incentive to learn and develop competences (Klarsfeld, 2003).

Research Methodology

The questionnaire

The questionnaire is the most widely used method of data collection in management science research (Evrard et al., 2009). It helps the researcher to obtain the maximum measurable data from a large sample.

To construct the questionnaire, it was first necessary to review the literature to identify the measurement scales concerning the studied concept. The selected items are based on the measurement scale developed by Igalens and Scouarnec (2001). This measurement scale is composed of five dimensions: recruitment, assessment, training, compensation and career management. To this end, we solicited the opinions of a dozen Tunisian project managers. The results of the pre-test enabled us to raise some suggestions to further improve the items' quality. The respondents helped us clarify several items so that they are more comprehensible for the target population.

The questionnaire consisted of two main parts. The first encompassed four descriptive questions related to the interviewee's personal characteristics: sex, age, professional experience and level of education. The second part encompassed 28 items related to the measurement of competence management (Appendices). The items of the questionnaire were measured using a 5 point Likert attitude scales: no agreement at all= 1, no agreement= 2, unsure= 3, agree= 4, strongly agree= 5.

Sample selection

The study population consisted of Tunisian project managers working for national and foreign companies in Tunisia. In the context of this research, it is difficult for reasons of cost, time and accessibility of the respondents to interview the entire study population. It is thus preferable to extract a sample. Which is why, the convenience sampling method that is based on a reasoned choice of individuals in the study population was adopted.

Data collection

As part of the present study, we chose two methods to administer the questionnaire: in-person and online surveys. The former was conducted in different regions in Tunisia from April to July 2017. The questionnaires distributed to Tunisian project managers totaled 250. Nevertheless, only 72 replies were received, 8 of which were rejected because of missing information. Hence the number of valid ones was 64. At the same time, 500 electronic questionnaires were sent to project managers. It was posted on the professional network "LinkedIn". The recovered questionnaires totaled 92. Therefore, the number of valid responses obtained from both the in-person and online surveys was 156.

The descriptive statistics

Our sample included 156 Tunisian project managers. Descriptive analysis was performed using statistical frequency tests. The study sample was composed of 135 men (86.5%) and 21 women (13.5%). Respondents between 30 and 49 years old accounted for 65.4%. Those under the age of 30 represented only 14.7%. Furthermore, most of them (82.1%) have a professional experience of more than two years. Finally, 46.2% of respondents have Master's degree compared to 32.7% having a bachelor's degree (Table 1).

Table 1: Characteristics of respondents

Description	Frequency	Percentage
Sex	135	86.5
Men		
Women	21	13.5
Age	23	14.7
Less than 30 years		
Between 30 and 49	102	65.4
More than 50 years	31	19.9
Experience	28	17.9
Less than 2 years		
2 to 10 years	85	54.5
More than 10 years	43	27.6
Education level	51	32.7
Bachelor		
Master	72	46.2
Other diplomas	33	21.1

Empirical data analysis

The steps of factor analysis

Principal component analysis (PCA) is a factor analysis method that facilitates the interpretation of the selected factor structures. Before implementing a PCA, we must first ensure that the collected data can be factored. Several statistical criteria need to be checked (Evrard et al., 2009): First, the PCA imposes the normal distribution of items. Two coefficients must be examined: the coefficient of symmetry (Skewness) and the coefficient of flattening (Kurtosis). Then, Bartlett's test is used to test the null hypothesis (H0) of independence between the items. The rejection of this hypothesis at a significance level (less than 5%) indicates that items are correlated and statistically significant. In addition, the Kaiser-Meyer-Okin (KMO) test is used to assess the quality of partial correlations between items to search for common dimensions. The value of the KMO index becomes unacceptable if it is less than 0.5. The Measure of Sampling Adequacy (MSA) test indicates the degree of precision of each item compared to others on the same measurement scale. If the value of the MSA index is less than 0.5, the item in question must be removed from the factor analysis. Finally, the communalities measure the variance share of each item retained by the factor structures. Indeed, each communality with a value less than 0.4 must be eliminated.

The extraction of the number of factors to be retained must follow two criteria. The Kaiser's rule identifies the factor structures whose eigenvalues are greater than or equal to 1. The percentage of variance explained must be greater than 50%. Once the number of factor structures retained is greater than 1, the next step is to perform an orthogonal rotation (Varimax) to facilitate the interpretation of the new factor structures (Carricano et al., 2010). Furthermore, Hair et al., (2010) recommend eliminating items that have a factor loading less than 0.5. In the case of multidimensional measurement scales, it is necessary to remove items that are highly correlated on several factors (greater than 0.5).

PCA is necessary, but not sufficient condition for assessing the internal reliability of measurement scales (Evrard et al., 2009). Indeed, the Cronbach's alpha coefficient evaluates the correlations between items of a measurement scale. The value of Cronbach's alpha is acceptable if it is greater than 0.7 in the case of an exploratory study.

The results of factor analysis

The measurement scale of competence management consisted of 28 items (*Appendices*). Before applying a PCA on these items, it is necessary to test the normal distribution. The examination of the coefficients of flattening (Kurtosis) and asymmetry (Skewness) showed that all the items follow a normal distribution, except item MC8 whose Skewness value (1.722) was greater than 1. Consequently, we decided to remove this item (MC8) and continue the factor analysis. Then, we performed a new PCA on all the 27 remaining items. The KMO index has a satisfactory value (0.785). In addition, Bartlett's sphericity test is significant (chi-square= 21841.140; dfl= 378, p= 0.000). We affirm also that MSA values are satisfactory, except 4 items (MC3, MC6, MC9 and MC24) which have MSA values less than 0.5. We therefore proceeded to delete these items. Then, we realized other new PCA on the remaining items. Henceforth, 4 items (MC7, MC13, MC21 and MC27) were deleted: Items MC21 and MC27 were highly correlated on several factors and items MC7 and MC13 represented a structure factor admitting a Cronbach's alpha value (0.418), i.e. less than 0.7 (Table 2).

Table 2: Eliminated items during factor analysis

PCA	Criteria	List of eliminated items
PCA 1	Eliminated items have MSA values less than 0.5.	MC3, MC6, MC9, MC24
PCA 2	Eliminated items that are highly correlated on several factors	MC21, MC27
PCA 3		
PCA 4	Eliminated items represent a structure factor admitting a Cronbach's alpha value less than 0.7	MC7, MC13

Besides, we performed a new PCA on the 19 remaining items that constitute the measurement scale of competence management. The value of KMO index (0.818) is satisfactory. Bartlett's test is statistically significant (Chi-square= 1817.682; dfl= 171; p= 0.000). In addition, the examination of anti-image correlation matrix shows that the MSA values are greater than 0.5. These results indicate that the data collected are factorable. By applying the "Varimax" rotation method, the results confirm the existence of a structure factor admitting five independent dimensions. This structure factor restores 75.806% of the initial information. The eigenvalues are greater than 1. In addition, the factor loadings of the items are greater than 0.5. The quality of representation is also satisfactory as the communalities are greater than 0.4. Table 3 summarizes the results of factor analysis concerning the measurement scale of competence management.

Table 3: The results of factor analysis

Items #	Extracted communalities	Factor loadings				
		F1 Recruitment	F2 Assessment	F3 Training	F4 Compensation	F5 Career management
MC1	.772	.807	**			
MC2	.811	.848				
MC4	.646	.743				
MC5	.786	.801				
MC10	.752		.813			
MC11	.770		.837			
MC12	.795		.854			
MC14	.784			.816		
MC15	.753			.837		
MC16	.791			.859		
MC17	.775			.816		
MC18	.775				.858	
MC19	.777				.867	
MC20	.749				.862	
MC22	.765				.853	
MC23	.635					.782
MC25	.769					.862
MC26	.731					.844
MC28	.766					.851

** Items with factor loading less than 0.5 were deleted during factor analysis.

The results of the factor analysis show that the measurement scale of competence management is composed of 19 items divided into five independent dimensions (recruitment, assessment, training, compensation and career management). The obtained Cronbach's alpha values for these dimensions are satisfactory because they are greater than 0.7 (Table 4).

Table 4: The results of reliability testing

The structure factors	Items	Cronbach's alpha
Recruitment	MC1, MC2, MC4, MC5	0,886
Assessment	MC10, MC11, MC12	0,849
Training	MC14, MC15, MC16, MC17	0,897
Compensation	MC18, MC19, MC20, MC22	0,894
Career management	MC23, MC25, MC26, MC28	0,869

Discussion of results

Companies require new ways to reconfigure their human resource function to better adapt to the needs of the business environment. They must be involved in human development activities to promote the competence level of their employees. Loufrani-Fedida and Saglietto (2016) do not consider competence management practices as responses to problems that are difficult to manage in companies but treat them as organizational responses to the maintenance and development of employees' competences. Companies must make every effort to develop effective competence management practices to ensure that their operations run smoothly and that they get the most out of their employees.

The policy of recruitment consists of finding the correct individual for each position who will be able to meet the performance expectation and future prospects within the organization (Khan and Rasheed, 2015). It is a process of choosing qualified candidates who have the potential to make a positive contribution to their company (Bratton and Gold, 2017). Employers no longer seek a strict match between the individual's competences and the job position. Instead, they are interested in the possibilities of individual

evolution. Therefore, the recruitment is carried out with care, ensuring not only the knowledge and skills of the candidate but also his/her attributes (Duif and Barry, 2011).

The assessment policy offers scrutiny of the present state of the competences of the employee. It is a process of judging the individual's performance in the accomplishment of his/ her tasks and assessing the degree of achieving planned objectives. It allows the company to obtain information on the effectiveness of an employee's performance (Raymond et al., 2015). Thus, the assessment outcome can be utile for the improvement of staff performance as well as decision-making. Furthermore, this assessment gives the individual an idea of his/ her performance outcome. Accordingly, he/ she can discuss with his/ her manager the prospects of his/ her career (Raymond et al., 2015). Indeed, the assessment offers the possibility of filling existing competence gaps through future training programs and also helps employees understand their weaknesses that require competence development (Tahsildari and Shahnaei, 2015).

In recent years, the demand for trained employees has increased rapidly, as working methods are constantly evolving within the company. Employees need to develop their competences so that they carry out their activities effectively. Lack of competences poses significant problems for employees. As a result, the training policy that facilitates the improvement of the individual's competences is placed at the heart of the learning process. Training provides a source of information and guidance on all the competences needed by the employee to succeed in his/ her career (Antonacopoulou, 1999). According to Marfuah and Panudju (2016), staff must be granted access to appropriate training programs to boost their competences. These training programs enable the employee to take responsibility for acquiring the required competencies and design his/ her professional development.

Compensation systems constructed based on the classification plans and pay have often been unable to deal with changes in the workplace (Shahzad et al., 2016). Companies are called upon to adopt competence-based compensation that encourages employees to take responsibility, autonomy and initiative (Alaei and Shahrezaei, 2015). Compensation rewards employees for developing and maintaining their competences by focusing on their performance and their potential abilities rather than just rewarding past performance (Azmi et al., 2009). Indeed, personnel are remunerated according to the level of competences acquired (Balkin et al., 2015). Indeed, two employees occupying the same position may have two different levels of reward. Therefore, compensation increase is allocated to competitive employees who prove novel or developed competences (Nalini et al., 2016). This urges the employee to involve in bridging his/ her competences gaps and promoting his/ her knowledge on a regular basis (Kiznyte et al., 2015).

Currently, the traditional career logic, based on qualifications and seniority, is not enough to encourage the employee and enhance his/ her professional development (Hölzle, 2010; Bredin and Söderlund, 2013). In fact, career development prospects establish an advantageous management instrument that captivates and retains staff in their positions (Huemann, 2010). Companies must enable their employees to acquire new competences and improve their career prospects (Ekrot et al., 2016). They need to ensure appropriate career plans (recognition of acquired competences, appropriate training courses and job rotation) to meet the needs of their employees (Alaei and Shahezaei, 2015). Indeed, career plans are developed to help employees clarify their career aspirations, identify their competences gaps and improve their performance (Hölzle, 2010). Hence the need to learn new knowledge and update existing competences which would allow employees to distinguish themselves from others and attain higher levels of career success.

Conclusions

This study aimed to operationalize competence management through the construction and validation of a questionnaire intended for Tunisian project managers. To this end, a quantitative study was conducted among 156 respondents. The principal component analysis and Cronbach's alpha calculations were used to ensure the validity and reliability of the factor structures. The results of the factor analysis confirm the existence of measurement scale of a competence management comprising five independent dimensions (recruitment, assessment, training, compensation and career management).

This study has three main theoretical contributions: First, to our knowledge, this is the first study that is interested in the operationalization of competence management in the Tunisian context. The second contribution consists in enriching the existing literature on the concept of competence and competence management, which we clarified by synthesizing many studies. Finally, it presents a global vision of competence management by analyzing five practices. Indeed, most studies have focused on an isolated practice, thus providing a limited understanding of competence management. Furthermore, this study also presents a managerial contribution as the questionnaire could be used for the diagnosis and analysis of competence management practices by project managers in their companies so that they can develop and enhance their employees' skills.

Furthermore, the present study has some limitations and new avenues of research. The first limitation refers to the choice of the measurement scale dedicated to operationalizing management competence. Indeed, the results of the factor analysis identified five practices, namely recruitment, assessment, training, compensation and career management. It would be pertinent to adopt or create new measurement scales in order to explore new competence management practices. The second limitation relates to the small sample size of the study (156 responses) which makes it hard to generalize the obtained results. It would also be interesting to conduct the study on a larger sample.

In short, the findings of this research have opened perspectives on the study of competence management in Tunisia (Hedhili and Boudabbous, 2017, 2018, 2020-1, 2020-2; Chouchène and Boudabbous, 2018).

References

- Alaei, M., & Shahrezaei, P. S. (2015). A theoretical structure for strategic human resource management in project oriented manufactures. *Cumhuriyet Science Journal*, 36(4), 2088-2096.
<https://pdfs.semanticscholar.org/ea6a/60035a917918c5a3bfc7435ca73d91edb8ae.pdf>
- Antonacopoulou, E. P. (1999). Training does not imply learning: The individual's perspective. *International Journal of Training and Development*, 3(1), 14-33. <https://doi.org/10.1111/1468-2419.00061>
- Aubret, J., Gilbert, P., & Pigeyre, F. (2005). *Management des compétences: Réalisations, concepts, analyses*. 2th edition. Paris: Dunod Editions.
- Azmi, I. A. G., Ahmad, Z. A., & Zainuddin, Y. (2009). Competency-based pay and service quality: An empirical study of Malaysian public organizations. *Asian Academy of Management Journal*, 14(1), 21-36.
- Balkin, D. B., Roussel, P., & Werner, S. (2015). Performance contingent pay and autonomy: Implications for facilitating extra-role creativity. *Human Resource Management Review*, 25(4), 384-395. <https://doi.org/10.1016/j.hrmr.2015.07.001>
- Ben Aissa, H., & Sassi, N. (2013). La perception de la charge de travail chez les cadres dans une logique de gestion des compétences, Paper presented at the Proceedings of the 24th Association Francophone de Gestion des Ressources Humaines - AGRH (Paris). <http://www.e-rh.org/dz-agrh-reference-rh/2013-benaissa-sassi.pdf>
- Bouteiller, D., & Gilbert, P. (2016). La diffusion de l'instrumentation de la gestion des compétences en Amérique du Nord depuis David C. McClelland. *Relations industrielles/ Industrial Relations*, 71(2), 224-246. <https://doi.org/10.7202/1036608ar>
- Bratton, J., & Gold, J. (2017). *Human resource management: Theory and practice*. London: Palgrave Macmillan.
- Bredin, K., & Söderlund, J. (2013). Project managers and career models: An exploratory comparative study. *International Journal of Project Management*, 31(6), 889-902. <https://doi.org/10.1016/j.ijproman.2012.11.010>
- Carricano, M., Poujol, F., & Bertrandias, L. (2010). *Analyse de données avec SPSS®*. 2th edition. Paris: Pearson Éducation.
- Chouchène, A., & Boudabbous, S. (2018). *Gestion par les compétences et performance organisationnelle: Application au cas tunisien*. Doctoral thesis in Management Science, Sfax: Faculty of Economics and Management of Sfax, Tunisia.
- Colin, T., & Grasser, B. (2006). Une évaluation quantitative de la diffusion des pratiques de gestion des compétences. (In) Defélix, C., Klarsfeld, A., & Oiry, E. (Eds) *Nouveaux regard sur la gestion des compétences* (pp. 207-228). Paris: Éditions Vuibert.
- Defélix, C. (2003). Ce que gérer les compétences veut dire. (In) Guenette, A. M., Rossi, M., & Sardas, J. C. (Eds) *Compétences et connaissances dans les organisations* (pp. 121-128). Lausanne: Société d'Etudes Economiques et Sociales (SEES).
- Defélix, C., & Retour, D. (2008). Peut-on relier stratégie d'entreprise et gestion des compétences? (In) Dupuich-Rabasse, F. (Eds) *Management et gestion des compétences*, (pp. 199-216). Paris: Editions L'Harmattan.
- Defélix, C., & Sanséau, P. Y. (2017). Comment des dirigeants-entrepreneurs fabriquent-ils de la gestion des compétences? Enseignements pratiques et théoriques. *Management & Avenir*, 98(8), 63-84. <https://doi.org/10.3917/mav.098.0063>
- Defélix, C., Colle, R., & Rapiou, M. T. (2008). Prendre en compte le facteur humain au sein des pôles de compétitivité: La longue marche vers l'innovation sociale. *Management & Avenir*, 20(6), 9-29. <https://doi.org/10.3917/mav.020.0009>
- Dejoux, C. (1999). Organisation qualifiante et maturité en gestion des compétences, Paper presented at the Proceedings of the 4th Association Internationale de Management Stratégique - AIMS (Chatenay-Malabry).
- Delobbe, N., Gilbert, P., & Le Boulair, M. (2014). Gérer des compétences: Une instrumentation en contexte, modélisation fondée sur l'étude de cas. *Relations industrielles/ Industrial Relations*, 69(1), 28-59. <https://doi.org/10.7202/1024206ar>
- Dietrich, A., Gilbert, P., & Pigeyre, F. (2010). *Management des compétences: Enjeux, modèles et perspectives*. 3th edition. Paris: Dunod Editions.
- Duif, J., & Barry, M. L. (2011). Towards a framework for human resource management processes in the mature project orientated organization: The case for an ICT organization in South Africa. Paper presented at the Proceedings of PICMET'11: Technology Management in the Energy Smart World.
- Durand, T. (2015). L'alchimie de la compétence. *Revue Française de Gestion*, 41(253), 267-295.
<https://doi.org/10.3166/RFG.160.261-292>
- Ekrot, B., Kock, A., & Gemünden, H. G. (2016). Retaining project management competence: Antecedents and consequences. *International Journal of Project Management*, 34(2), 145-157. <https://doi.org/10.1016/j.ijproman.2015.10.010>
- Evrard, Y., Pras, B., & Roux, E. (2009). *Market - Études et recherches en marketing*. 4th edition. Paris: Dunod Editions.
- Gilbert, P. (1994). La Gestion des compétences: Du discours à la construction de nouvelles pratiques sociales. (In) Piganiol-Jacquet, C. (Eds) *Analyses et controverses en gestion des ressources humaines*. (pp. 213-230). Paris: Editions L'Harmattan,
- Grimand, A. (1996). La notion de compétence en gestion des ressources humaines: De la controverse au construit opératoire. Doctoral thesis in Management Sciences. Lyon: University of Jean Moulin Lyon 3.
- Hair, J. F., Black, W., Babin, B. J., & Anderson, R. (2010). *Multivariate data analysis*. 6th edition. New Jersey: Pearson Prentice Hall.
- Hedhili, M. A., & Boudabbous, S. (2017). *Gestion par les compétences et politiques de ressources humaines: Application au cas tunisien*, Paper presented at the International Colloquium: Développement Durable et Pratiques Innovantes, (Hammamet)

- Hedhili, M. A., & Boudabbous, S. (2018). Organisation par projets et gestion des compétences: Application au cas tunisien. Doctoral thesis in Management Science, Sfax: Faculty of Economics and Management of Sfax, Tunisia.
- Hedhili, M. A., & Boudabbous, S. (2020-1). The impact of project-based organization on competence management practices: Case of Tunisian Companies. *International Journal of Research in Business and Social Science*, 9(2), 177-191. <https://doi.org/10.20525/ijrbs.v9i2.637>
- Hedhili, M. A., & Boudabbous, S. (2020-2). Recruitment and evaluation practices at the service of project-based organization and competence management: Case of Tunisian companies. *Asian Journal of Social Sciences and Management Studies*, 7(1), 17-24. <https://doi.org/10.20448/journal.500.2020.71.17.24>
- Hölzle, K. (2010). Designing and implementing a career path for project managers. *International Journal of Project Management*, 28(8), 779-786. <https://doi.org/10.1016/j.ijproman.2010.05.004>
- Huemann, M. (2010). Considering human resource management when developing a project- oriented company: Case study of a telecommunication company, *International Journal of Project Management*. 28(4), 361-369. <https://doi.org/10.1016/j.ijproman.2010.02.008>
- Igalens, J., & Scouarnec, A. (2001). La gestion par les compétences: Construction d'une échelle de mesure. *Revue de Gestion des Ressources Humaines*, 40, 2-16. <https://pascal-francis.inist.fr/vibad/index.php?action=getRecordDetail&idt=15752182>
- Kerlan, F. (2012). Guide pour la GPEC: Gestion prévisionnelle des emplois et des compétences. 4th edition. Paris: Editions Eyrolles.
- Khan, A. S., & Rasheed, F. (2015). Human resource management practices and project success, a moderating role of Islamic work ethics in Pakistani project-based organizations. *International Journal of Project Management*, 33(2), 435-445. <https://doi.org/10.1016/j.ijproman.2014.08.006>
- Kiznyte, J., Ciutiene, R., & Dechange, A (2015). Applying cultural intelligence in international project management. Paper presented at the 4th International Scientific Conference on Project Management in the Baltic Countries: Project Management Development - Practice and Perspectives, Riga: University of Latvia.
- Klarsfeld A. (2003). Peut-on rémunérer explicitement les compétences?, Paper presented at the Academic Day: Compétences, IREPD-LEPII (Grenoble).
- Klarsfeld, A. (2006). La gestion des compétences: Le défi de sa mesure. (In) Defélix, C., Klarsfeld, A. & Oiry, E. (Eds) *Nouveaux regards sur la gestion des compétences* (pp. 229-251). Paris: Éditions Vuibert.
- Le Boterf, G. (1995). De la compétence: Essai sur un attracteur étrange. 2th edition. Paris: Edition d'Organisation.
- Loufrani-Fedida, S., & Aldebert, B. (2013). Le management stratégique des compétences dans un processus d'innovation: Le cas d'une TPE touristique. *Revue de Gestion des Ressources Humaines*, 89(3), 56-72. <https://doi.org/10.3917/grhu.089.0056>
- Loufrani-Fedida, S., & Saglietto, L. (2016). Mechanisms for managing competencies in project-based organizations: An integrative multilevel analysis. *Long Range Planning*, 49(1), 72-89. <https://doi.org/10.1016/j.lrp.2014.09.001>
- Marfuah, U., & Panudju, A. T. (2016). Effectiveness of human resource development program at offshore project. *International Journal of Scientific & Technology Research*, 4(8), 234-239. <http://paper.researchbib.com/view/paper/118212>
- MEDEF. (1998). Objectif compétences. Paris: Editions CNPF.
- Michaux, V. (2007). Intérêt pour la notion de compétence collective des travaux fondateurs sur les communautés de pratiques de Brownm Duguid et de Wenger, Paper presented at the Proceedings of the 18th Association Francophone de Gestion des Ressources Humaines - AGRH (Fribourg).
- Mirallès, P. (2007). La gestion des talents: Emergence d'un nouveau modèle de management?, *Management & Avenir*, 11(1), 29-42. <https://doi.org/10.3917/mav.011.0029>
- Nalini, R., Alamelu, R., Amudha, R., Gowri, R., Sujana, S. S. (2016). Competency driven remuneration and performance among IT professionals: A Study in urban segment. *Indian Journal of Science and Technology*, 9(27). <https://doi.org/10.17485/ijst/2016/v9i27/9761>
- Pesqueux, Y. (2002). Peut-on parler de l'émergence d'un modèle de l'organisation sur la base des compétences?, Paper presented at the 1st Colloquium Gestion des compétences et Knowledge Management: Renouveau de Création de Valeur en Gestion des Ressources Humaines? (Rouen). <https://hal.archives-ouvertes.fr/hal-00480978/document>
- Raymond, A., Noe, J. R., Gerhart, B., & Wright, P. (2015). *Human Resource Management: Gaining a competitive advantage*. NewYork: McGrawHill/ Irwin.
- Sassi, N., & Ben Aissa, H. (2016). Analyse des composantes de la charge de travail perçue par les cadres dans un contexte de gestion des compétences. *Relations Industrielles/ Industrial Relations*, 71(3), 494-520. <https://doi.org/10.7202/1037662ar>
- Scouarnec, A. (2000). Pratiques de gestion par les compétences et perception des salariés: Une analyse des effets sociaux. Doctoral thesis in Management Sciences. Caen: University of Caen-Normandie
- Ségal, E. (2009). Modélisation de la gestion des compétences: Une vision internationale. *Information Science for Decision Making*, <http://isd.univ-tln.fr/PDF/isd36/SEGAL-VF-05.07.09.pdf>
- Shahzad, K., Bajwa, S. U., Ansted, R. B., Mamoon, D., & Khaliq-ur-Rehman. (2016). Evaluating human resource management capacity for effective implementation of advanced metering infrastructure by electricity distribution companies in Pakistan. *Utilities Policy*, 41, 107-117. <http://dx.doi.org/10.1016/j.jup.2016.06.011>
- Stroobants, M. (1993). La compétence à l'épreuve de la qualification, (In) Durand, J. P. (Eds), *Vers un nouveau modèle productif*, Paris: Editions Syros.

- Tahsildari, A., & Shahnaei, S. E. (2015). Enhancing organizational effectiveness by performance appraisal, training, employee participation, and job definition. *European Journal of Business and Management*, 7(12), 56-63
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.735.1222&rep=rep1&type=pdf>
- Ughetto, P. (2014). Référentiels de compétences: Ce que l'instrument fait à la logique compétence. (In) Prot, B. (Eds) *Les Référentiels contre l'activité* (pp. 35-49). Toulouse: Octarès Editions. <https://hal-enpc.archives-ouvertes.fr/hal-01059281v2/document>
- Van Beirendonck, L. (2006). *Tous compétents! : Le management des compétences dans l'entreprise*. Brussels: Editions de Boeck Supérieur
- Zarifian, P. (1988). L'émergence du modèle de la compétence. (In) Stankiewicz, F. (Eds) *Les stratégies d'entreprises face aux ressources humaines* (pp. 77-82). Paris: Editions Economica.
- Zarifian, P. (1999). *Objectif Compétence: Pour une nouvelle logique*. Rueil-Malmaison: Editions Liaisons.
- Zarifian, P. (2002). La politique de la compétence et l'appel aux connaissances à partir de la stratégie d'entreprise post-fordiste, Paper presented at the 1st Colloquium Groupe de Travail Gestion des Compétences et des Connaissances en Génie Industriel (Nantes).

Appendices

The operationalization of competence management

- **MC1:** During recruitment, what is important is the candidate's diploma and level of training.
- **MC2:** During recruitment, what is important is the experience acquired.
- **MC3:** During recruitment, what is important is the ability to cooperate with others.
- **MC4:** During recruitment, what is important is the ability to adapt and analyze.
- **MC5:** During recruitment, what is important is the contribution of the candidate to the company.
- **MC6:** During recruitment, what is important are the criteria of autonomy and taking initiative.
- **MC7:** I have an annual assessment of my competencies with my supervisor.
- **MC8:** My supervisor is interested more in my attitudes.
- **MC9:** I have a personalized document which specifies my activities and my competencies.
- **MC10:** I am assessed according to my knowledge
- **MC11:** I am assessed according to my skills.
- **MC12:** I am assessed according to my attitudes.
- **MC13:** I can easily have a training course if I need it.
- **MC14:** I have an individual training program.
- **MC15:** I regularly participate in training courses.
- **MC16:** My employability (ability to find work outside the company) is greater.
- **MC17:** My competence level has increased through training.
- **MC18:** My compensation is based on my proven abilities and not on the job position I hold.
- **MC19:** My compensation is based on my individual contribution to the company.
- **MC20:** My compensation is based on my competencies used in my personal work situation.
- **MC21:** My compensation is based on my job title and position.
- **MC22:** My compensation is based on what I can bring to the company in the future.
- **MC23:** I get information about my job and its activities.
- **MC24:** I take less initiative.
- **MC25:** I reach and often exceed the objectives.
- **MC26:** In my work, I seek new ideas and I show creativity.
- **MC27:** I no longer seek to make efforts to develop my competencies.
- **MC28:** In my work, I am enterprising and I am not afraid to act.