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Determining the effect levels of augmented decent work criteria in sustainable economic development with the fuzzy DEMATEL method

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ABSTRACT

Creating decent work is among the priority issues for sustainable employment and development. This study aimed to determine the effect levels of the International Labour Organization (ILO) decent work criteria by augmenting nine indicators in the ILO manual to 12 criteria through a comprehensive literature review. Fuzzy DEMATEL, a multi-criteria decision-making method, has been preferred in this context. According to the analysis results of the study, the most heavily ranked criteria are 'healthy workplace environment', 'decent working hours' and 'safe working conditions' respectively, which contribute to the decent work concept. Further, 'balance between work–family–personal life' has been found the most affected criterion, while 'education and training system' has been the most affecting. Based on the findings, remedial and developing strategies are suggested on issues such as corporate culture, working hours regulation, safe working environment, subordinate–superior relations, social activities and regulations that take family life into account.

KEYWORDS

decent work; sustainable development; fuzzy DEMATEL; welfare; economic sociology

1. Introduction

The globalization of labor markets has both positive and negative implications. These negative effects might be manifested as inequality, job security, pay issues, etc. At the 87th Labor Conference conducted by the International Labour Organization (ILO) in 1999, the idea of 'decent work' was introduced in an effort to remove the aforementioned negative impacts that have a profound impact on socioeconomic welfare [1]. The ILO has placed decent work on the agenda as where working conditions are provided in accordance with occupational health and safety standards, without forced and child labor, with opportunities for social security and union representation, and where the appropriate wage is paid for the work performed [2]. Moreover, decent work is a comprehensive concept that encompasses a tripartite agreement on the fundamental rights and principles of labor between the government, the employee and the business [3].

This study focuses on the essential component of the ILO's definition of decent work, which contributes to the sustainability of labor peace and establishes principles and goals for working life to achieve a particular level worldwide. Yet this concept emphasizes principles such as enjoying rights at work, social protection, social security, fostering social discussion and access to full and productive employment. In addition to these principles, emphasis is placed on conditions such as adequate earnings and effective work, reasonable working hours, job stability and security, equal employment opportunities, harmony between work–family–personal life, abolition of inhumane work, a safe working environment and the psychological condition of employees [4,5]. In line with these principles and objectives, various strategies have been developed regarding working conditions since its establishment [6].

One of these strategies is to improve business practices in a decent manner with the definition of decent work. Additionally, decent work is included in the sustainable development agenda of the United Nations (UN) as well as the ILO. Decent work is also an important goal for both individuals and policymakers trying to promote social justice. According to the psychology of work theory [7], three essential factors meet the human need for decent work: survival needs, social connection needs and self-determination needs. In this framework, these three essential factors are among the development indicators as they increase the level of human welfare and are necessary for policymakers [8]. For this purpose, extensive literature has been included. Accordingly, the criteria, which are the components of the decent work concept, have been determined following the extensive literature and analyzed within the framework of experienced experts' opinions. The primary objective of this study is to assist the ILO in implementing a decent work policy to mitigate the hazards linked to the escalating global income disparity by contributing Sustainable Development Goal (SDG)-8, which is 'Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all' [9]. Within this context, this study aims to make decent work a current issue by discussing emerging disparities and their associated economic and social impacts, particularly concerning their alignment with sustainable development objectives by enriching employment opportunities.

This study is thought to have various important novelties. The first is the augmentation of nine indicators determined in the ILO manual [10] to 12 criteria, supported by a pervasive literature review. Therefore, this study aimed to fill this gap in the literature. The second novelty of the study is that the criteria

determined in the ILO manual and the relevant literature are handled with the multi-criteria decision-making method (fuzzy DEMATEL), as there are a limited number of studies using this method in the literature. In this context, when the literature is examined, it is seen that the studies on the subject are mainly conducted, on the one hand, with economic models such as panels and time series, and theoretically on the other. Yet there are some inherent disadvantages of doing most studies in the literature within the framework of econometric models. This points to the lack of a detailed perspective based on non-numerical data. Therefore, this situation can be considered a disadvantage for policymakers and international organizations in the relevant field. Therefore, this study was analyzed using the fuzzy DEMATEL multi-criteria decision-making method, which is directly based on the expert opinions of the field. The third innovation is the determination of the importance ranking of 12 decent work criteria, determined in the light of the information we have obtained from the ILO and the literature, as a result of the fuzzy DEMATEL method, and determining whether these criteria are affected by each other. Thus, these results will guide policymakers and international organizations. One of the aims of this study is to also determine the most concrete and specific proposals for policymakers and international organizations and to put forward the most effective strategies, taking into account the results.

DEMATEL differs from other methods in a number of ways. The method's principal objective is to obtain more comprehensive results by visualizing intricate cause-and-effect relationships. It is also an efficient method for obtaining information from a specific group. DEMATEL is significant to gain a deeper grasp of the interdependent criteria and their cause-and-effect interactions. However, it is incredibly challenging to determine the degree of interaction between these components. Thus, the DEMATEL method has been modified for fuzzy settings [11]. The integration of the fuzzy approach with DEMATEL in this study is motivated by various factors. Combining quantitative viewpoints and qualitative analyses in evaluation methods can address concerns about subjective and inaccurate traditional methodologies, given the complex and dynamic nature of decent work indicators [12,13]. Furthermore, fuzzy theory is extensively employed in the analysis of management decisions involving several criteria [14–17]. Within fuzzy theory, experts have the capacity to employ natural semantics for direct evaluation. This assessment is then transformed into a numerical value that represents the likelihood of various occurrences occurring, based on the degree of correlation between the evaluator and distinct membership function relationships. Therefore, the evaluator can effortlessly and comprehensively articulate the evaluative worth of their subjective assessment [18]. Furthermore, DEMATEL appears to be well suited for the examination and assessment of decent work indicators in situations that lack clarity or are uncertain. DEMATEL is primarily used to assess complicated and inter-related criteria in social science problems, and to examine the relationships and causalities between them. It surpasses the limitations of conventional statistical analysis approaches by determining the directionality and magnitude of influence among indicators [19]. As far as we know, the DEMATEL approach has not been used to analyze decent work indicators.

This article consists of five sections. This introduction presents theoretical information about decent work and details about the study, e.g., purpose, method, scope and importance. A comprehensive literature review of the research

is then made in the second section. The methodology of the application is explained in the third section, and the analysis results are presented in the fourth section. The last section puts forth the conclusion and discussion.

2. Literature review

For this study, an augmented criteria list has been created as a result of the evaluation and modification of the criteria in the ILO 'Decent work indicators' (2013) manual [10] and thereupon the assessment of the relevant criteria with an extensive literature review. The criteria are considered in pairs with the criterion that is thought to be closer. For each criterion, a literature review was conducted from relevant sources.

2.1. 'Safe working conditions', 'healthy and quality workplace environment' and 'job satisfaction and commitment'

'Safe working conditions' is one of the most important indicators of decent work and is aimed at both the continuity of the employee's health and the sustainability of the work. The extent to which workers are protected from work-related hazards and risks is identified and tracked through four indicators: '(i) fatal occupational accident frequency rate, (ii) non-fatal occupational injury frequency rate, (iii) time lost per occupational accident, and (iv) labor inspection' [10]. Moreover, Takala [20] indicated that the ILO setting standards on occupational safety has been very productive in the past. Still, the problem is more on the implementation side, especially in developing countries. In response to that problem, 'The InFocus on Safety and Health at Work and Environment' program has been developed for better implementation and enforcement of ILO standards. Likewise, the correlation between workplace safety and productivity in a multinational corporation during 2018–2021 was investigated by Gomes et al. [21]. According to their findings, greater productivity levels are positively correlated with a secure working environment.

In their research, Duffy et al. [22] developed an empirical model to construct a work psychology theory (PWT) in the context of decent work, utilizing the approaches of occupational psychology, multicultural psychology and work sociology. Within the scope of the study, the antecedents and consequences of securing decent work are discussed with their psychological and economic effects. On the one hand, Arnoux-Nicolas et al. [23] found that unfavorable working conditions cause cease of employment; on the other, Duffy et al. [24] analyzed whether, with the provision of decent work, it is possible to improve the mental and physical health of employees. Similarly, in a study on PWT, Chen et al. [25] evaluated the predictors and outcomes of decent work using samples of public and non-public Chinese workers from various economic and professional backgrounds. In a recent study, Smith et al. [26] investigated the role of workplace relational civility (WRC) in moderating the effects of decent work and self-determination demands. A result of the study is that decent work fulfills self-determination prerequisites through WRC, significantly moderating their relationships.

2.2. 'Social security system' and 'social dialog'

A social security system is one of the essential indicators of decent work. The social security system may be directly

related to working conditions such as illness, unemployment, disability, old age and maternity, as well as other factors such as financial inadequacy in accessing health services and providing for the family (especially children under the age of 18 years), and in this context, poverty and social exclusion may occur [10]. The primary purpose of social dialog is to develop consensus among workers. According to the ILO, social dialog encompasses all types of discussion, consultation and information exchange between government, employer and worker representatives on shared interest problems. It covers tripartite social dialog methods and structures like social and economic councils, trade unions, employers' associations and collective bargaining. Since social dialog is one of these fundamental labor rights, there is a renewed interest in producing social dialog measures or indicators [10,27,28].

Edralin [29] evaluated the impact of collective bargaining agreements on decent work for 16 unionized enterprises operating in the Philippines (hotel, banking, aviation and broadcasting sectors). The findings indicate that collective bargaining is a potent tool that can aid in securing fair wages, integrating low-income workers and strengthening unions, thereby positively impacting decent work. In another country-specific study, Dhakal and Burgess [30] examined decent work and related policies on social protection and social dialog programs within the framework of Nepal's attainment of SDGs. According to the research results, due to the structural instability of the political processes, there are no strategic orientations toward the lack of capacity in the informal sectors in the context of decent work.

Additionally, in an examination of decent work in India, Muktan [31] found out that expansion in the service and organized manufacturing sectors can contribute to the employment rate. However, in terms of quality, such as 'social security and social dialog' among salaried/paid employees, it has a negative and significant impact. In a different study in South Africa, Cohen and Moodley [32] determined that social protection programs were insufficient to cover most of the population economically and that social dialog processes and organizational structures were not adequately successful.

2.3. 'Human rights and justice in workplace' and 'labor regulation and security of work'

Equal opportunity and treatment in employment is a significant component of the Decent Work Agenda, which focuses on non-discrimination and gender equality. These issues are also meant to address other demographic groups that may be exposed to prejudice, such as racial, ethnic or indigenous groups, rural workers, migrant workers and people with disabilities [10,33]. On this topic, Lawrence et al. [34] analyzed whether the concept of decent work is understood and implemented by local governments in the construction industry and related services and project practices, as part of an international applied research project conducted in collaboration with the University of Geneva, ILO and consultants. Moreover, discrimination against workers (children, women, foreign workers) is regarded as one of the conditions for equality. In a similar country-based study, Webster et al. [35] developed a scale for developing strategies to create decent works by researching South African workers in the 'security, agriculture, and hospitality' sectors. In addition, the issue of 'equal opportunity and treatment' was discovered to be more egalitarian in the hospitality sector.

The ILO's initial definition of decent work was based on the notion of security. From this point of view, the state and businesses should provide workers' income stability and safety, i.e., that workers can earn a living wage through their labor, thereby ensuring their survival [36,37]. Job stability and security is a factor that allows for the distinction of distinguished workers by perseverance and resiliency in the absence of subsistence working conditions. The employment termination regulations attempt to protect the employer's right to fire an employee for a justifiable reason and the employee's right not to be unjustly denied employment [10]. Linked to this topic, Posthuma [38] analyzed the challenges of implementing employee legislation in the context of decent employment in global manufacturing networks. In a similar study, Broemb- sen and Harvey [39] examined the issue of instability and job insecurity for home-workers as informal wage earners lacking legal and social security. In addition, Cooke et al. [40] analyzed industrial relations and employee social relations expectations in China from an interdisciplinary socioeconomic approach based on decent work, both culturally and legally.

2.4. 'Decent working hours' and 'balance between work-family-personal life'

Working time regulations are essential to decent work, providing information on production efficiency over output with employment and working time calculation. Overtime employment (more than 48 h per week according to the ILO) and the resulting underemployment rate can reveal deficiencies in employment quality. Additionally, excessive hours are often an indication of low hourly income. Typically, a lack of work possibilities is correlated with short hours [10,36]. In this connection, a study conducted by Duffy et al. [22] researched whether a job that provides leisure time and sufficient rest time is compatible with decent work and therefore is suitable for work psychology. In another remarkable study, Kim [41] utilized text network analysis to investigate the main issues surrounding mortality caused by overwork among postal workers, governmental officers and courier workers, as reported in Korean media in the last 10 years. Establishing the maximum working hours limit in accordance with decent work criteria involves reducing working hours, identifying industrial accidents and enhancing working conditions.

In this context, excessive working time disrupts the balance between work, family and personal life, raises the risk of accident hazards, implies insufficient hourly income and poses a long-term threat to workers' physical and mental capacity. Consistently working long hours might also diminish marginal output. The substantive component 'combining work, family, and personal life' encompasses a collection of decent work indicators about fundamental rights at work and social protection (e.g., decent working hours, maternity leave or parental leave) [10]. Moreover, identifying the balanced composition of the relationship between 'work, family and personal life' is not easy, as there are significant differences between individuals, cultures and countries, as this balance can be undermined if poorly managed [42]. For example, in a study of Turkish employees, Kozan et al. [43] determined that decent work predicts job satisfaction and life satisfaction, and if sufficient time for rest and leisure, as well as support for family and social values, is provided, employees are satisfied with their work and their lives in general. Similarly, in a study testing the validity of the Italian version of the 'decent work scale' (DWS), Di

Fabio and Kenny [44] found that work/family balance is vital to Italian employees in order to balance family interactions and career needs, and indirectly aligned with the DWS component referring to organizational values that complement family and social values.

2.5. 'Adequate earnings' and 'career adaptability'

To be consistent with the notion of decent work, companies must give workers enough earnings, while one of the ILO's principal aims is, as in the Declaration of Philadelphia, 'a just share of the fruits of progress to all, and a minimum living wage to all employed and in need of such protection' [10, p. 65]. That is, an employee's earning package should include salary, compensation for the period non-labored, bonuses as well as household allowances [10,22]. In addition to this, the economic and social environment might impact the sustainability of decent work, especially housing affordability [42,45]. In a study applying a qualitative study of employee narratives in New Zealand, Yao et al. [46] researched the concept of 'living wage' in terms of sustainable livelihood and personal and family well-being. One of the key findings of the research is that living wage is more than a monetary concern and can enhance well-being through subjective perceptions of 'job satisfaction, equality, and security'. Likewise, in a study examining the employment opportunities and adequate earnings of those working in the Indonesian automotive sector within the context of decent work, Wicaksono and Priyadi [47] discovered that skilled workers have more significant opportunities to upgrade their skills and enjoy improved welfare outcomes, whereas less-skilled workers remain in precarious conditions. Conclusively, Yildirim et al. [48] examined 417 survey responses using structural equation modeling (SEM) to evaluate the impact of wages on decent work in the maritime industry. The research results indicate that seafarers receiving adequate salaries positively affects various aspects of decent working criteria, such as access to health services, safe working conditions, and institutional values that align with family and social values.

Career adaptability is a vital perspective for employees to maintain decent work. Such that, by making a career plan, employees can both have the possibility to eliminate the problems they may face in the future and create the opportunity to shape their future according to their abilities and desires. In this regard, in a study based on PWT, England et al. [49] examined the predictors of decent work in a sample of 528 female employees. Using SEM, they found that 'women's experiences of marginalization, work volition, and career adaptability' directly correlated with a successful career path. Besides, in the first qualitative study to evaluate the term career adaptability of retirees, Luke et al. [50] sought to determine whether career adaptability is connected with returning to work as a reinforcing factor or as a consequence of returning to work. As a result of the theme analysis of the interview transcripts with 22 retirees, four sources of career adjustment were discovered: 'anxiety, control, curiosity, and confidence'. Lastly, Kozan et al. [43] used a sample of 401 low-income Turkish employees to evaluate the associations of social class with work volition and career adaptability in predicting 'decent work and job and life happiness'. Directly and indirectly, social class predicts decent work through job motivation and career adaptability. Correspondingly, decent work forecasts happiness in the workplace and life.

2.6. 'Employment opportunities (creation)' and 'education and training system'

'The creation of employment opportunities' is a crucial component of decent work. Although job creation is directly dependent on the socioeconomic status of the country, it is also related to the growth and expansion of businesses across the country. The accountability to create job opportunities interacts with many parties, from policymakers to working people to entrepreneurs [42,51]. 'Employment opportunities' tackles a vital indicator in the labor market circumstances that employers, employees, prospective workers and unemployed encounter (people 'not in labor force' are affected) [10]. As a significant predictor of job creation, decent work reflects both workers' rights in the workplace and employers' concerns about entrepreneurship growth. In this context, it has made employment creation a crucial objective for the development goals of particularly developing nations [33]. Relatedly, in research investigating job possibilities in the Indonesian car industry within decent work, Wicaksono and Priyadi [47] found that qualified workers have more significant opportunities to develop their skills and have enhanced welfare outcomes compared to those less qualified. Additionally, in a book published by the ILO on 'Care Work and Care Jobs', Addati et al. [52] specified that investment in quality care services could be a strategic policy intervention to increase women's economic empowerment by creating decent employment opportunities.

Another vital criterion for contribution to decent work is an effective 'education and training system'. Since the concept of equality is ambiguous, it needs defuzzification on what issues. In this sense, especially democratic rights, income distribution and use of resources have an important place. Further to that, equal opportunity in access to education and training is an essential touchstone in reaching them, e.g., a constitutional right to equal treatment should also be interpreted as a right to equal opportunity. In this framework, the right to education and vocational training should ensure equality of opportunity in accessing education and training services [51,53]. In this context, researching the value of school and work-based learning (WBL) in preparing students for meaningful work and life, Kenny et al. [54] interviewed 18 low-income graduates from a Catholic high school in the USA. According to the findings of the study, it has been determined that WBL has the potential to facilitate access to resources by creating educational and psychological values for low-income youth; in this sense, structural and contextual factors play a critical role in accessing decent work and life opportunities in the post-secondary period. Furthermore, Choi et al. [55] conducted a study analyzing the influence of vocational education on decent work in Indonesia based on gender, utilizing ordinary least squares (OLS) and Heckman's techniques. As an outcome of the study, vocational education in Indonesia helps create decent opportunities, but men have a competitive edge over women. Finally, in a report (published by ILO) investigating whether education is a solution to decent work for young people in developing economies, Sparreboom and Staneva [56] endeavored to identify quality mismatches in the transition to work process by using the survey method in 28 countries worldwide. According to the project's findings, better-educated youths in developing nations have comparatively high unemployment rates because they are unprepared for in-demand jobs in the labor market. As a result, increasing

the education level in developing economies will not increase employment and decent work on its own; more importantly, it is essential to integrate training into related professions beyond education.

3. Implementation

3.1. Fuzzy DEMATEL method

DEMATEL (Decision Making Trial and Evaluation Laboratory) is a technique developed by the Geneva Battelle Memorial Institute that determines the interaction between the variables affecting the decision in a multi-criteria decision-making environment [57]. The most important advantage of the DEMATEL method, which evaluates indirect relations with a conciliatory cause and effect relationship, is that it examines the structure and relationships between the system components or the valid number of alternatives. In this respect, it differs from other multi-criteria decision-making techniques. In the DEMATEL method, the interrelationships of the elements in complex problem sets are determined, and a structural model is presented to weight the effects on each other depending on these relations [58].

However, the fuzzy DEMATEL method integrates the classical DEMATEL approach with fuzzy set theory [59] in order to eliminate the uncertainties arising from human nature and provides solutions based on fuzzy numbers. This way, the relationships between imprecise (relative) concepts and criteria can be evaluated instead of exact values. The application of the fuzzy DEMATEL method consists of seven steps. These seven stages are illustrated in the flow chart in Figure 1, and the implementation is carried out according to this order.

In the first stage, information about the problem is collected, and a decision group is formed from experts in the field about the issue. In the second stage, the n -criteria are determined, and then the fuzzy scale is created. The scaling of the criteria is presented in Table 1. In addition, a triangular fuzzy number set is considered in the study. The number of fuzzy triangular sets is expressed as (l, m, u) and represents, respectively, 'the smallest possible value (l)', 'the most promising

Table 1. Fuzzy rating scale.

Abbreviation	Impact score	Fuzzy number equivalents
VL	0	(0.00; 0.00; 0.25)
L	1	(0.00; 0.25; 0.50)
N	2	(0.25; 0.50; 0.75)
H	3	(0.50; 0.75; 1.00)
VH	4	(0.75; 1.00; 1.00)

Note: H = high influence; L = low influence; N = medium influence; VH = very high influence; VL = no influence.

value (m)' and 'the largest possible value (u)' describing a fuzzy event [60,61].

In the third step, a fuzzy direct relationship matrix is created. Experts compare criteria ($C_1, C_2, C_3, \dots, C_n$) using linguistic expressions and measure the effect of one criterion on another. Thus, p unit fuzzy matrices $\tilde{Z}^1, \tilde{Z}^2, \dots, \tilde{Z}^p$ are obtained, each corresponding to an expert. In accordance with this, the direct relation matrix created by expert k consists of $\tilde{z}_{ij}^k = (l_{ij}^k, m_{ij}^k, u_{ij}^k)$ triangular fuzzy numbers, whose elements demonstrate the amount of effect of the i th criterion on the j th criterion, is given as follows [62]:

$$z = \begin{bmatrix} 0 & \tilde{z}_{12} & \cdots & \cdots & \tilde{z}_{1n} \\ \tilde{z}_{21} & 0 & \cdots & \cdots & \tilde{z}_{2n} \\ \vdots & \vdots & \ddots & \cdots & \vdots \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \tilde{z}_{n1} & \tilde{z}_{n2} & \cdots & \cdots & 0 \end{bmatrix} \quad (1)$$

$$\tilde{Z} = \frac{\tilde{Z}^1 + \tilde{Z}^2 + \tilde{Z}^3 + \dots + \tilde{Z}^n}{n} \quad (2)$$

In the fourth step, normalization is performed and a normalized fuzzy direct relation matrix (X) is created. In the fuzzy direct relationship matrix created in the third step, the fuzzy number values for each ' u ' column are added separately, and the highest value is determined. This value is represented by r . For the actions related to the fourth stage, Equations (3)–(8)

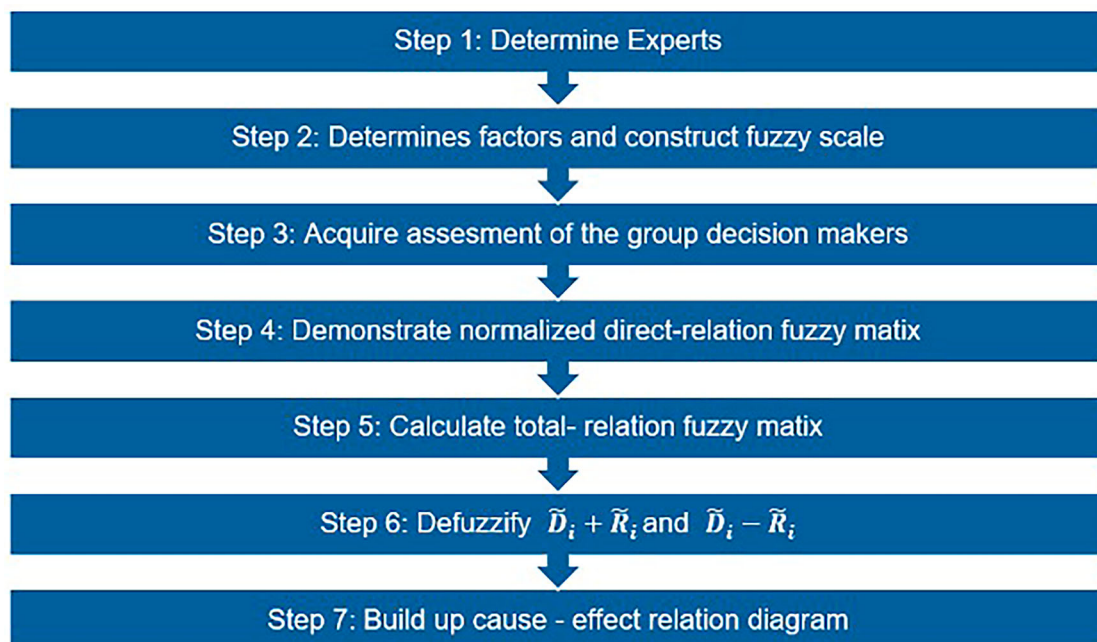


Figure 1. Flowchart of the fuzzy DEMATEL method. Note: $\tilde{D}_i + \tilde{R}_i$ = overall level of impact across criteria; $\tilde{D}_i - \tilde{R}_i$ = strength of causal influence between criteria.

are considered [63]:

$$\tilde{X} = \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \cdots & \cdots & \tilde{x}_{1n} \\ \tilde{x}_{21} & \tilde{x}_{22} & \cdots & \cdots & \tilde{x}_{2n} \\ \vdots & \vdots & \ddots & \cdots & \vdots \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \tilde{x}_{n1} & \tilde{x}_{n2} & \cdots & \cdots & \tilde{x}_{nn} \end{bmatrix}, \quad (3)$$

$$\tilde{x}_{ij} = \frac{\tilde{z}_{ij}}{r} = \left(\frac{l'_{ij}}{r}, \frac{m'_{ij}}{r}, \frac{u'_{ij}}{r} \right), \quad (4)$$

$$r = \max_{1 \leq i \leq n} \left(\sum_{j=1}^n u_{ij} \right), \quad (5)$$

$$X_l = \begin{bmatrix} 0 & l'_{12} & \cdots & \cdots & l'_{1n} \\ l'_{21} & 0 & \cdots & \cdots & l'_{2n} \\ \vdots & \vdots & \ddots & \cdots & \vdots \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ l'_{n1} & l'_{n2} & \cdots & \cdots & 0 \end{bmatrix}, \quad (6)$$

$$X_m = \begin{bmatrix} 0 & m'_{12} & \cdots & \cdots & m'_{1n} \\ m'_{21} & 0 & \cdots & \cdots & m'_{2n} \\ \vdots & \vdots & \ddots & \cdots & \vdots \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ m'_{n1} & m'_{n2} & \cdots & \cdots & 0 \end{bmatrix}, \quad (7)$$

$$X_u = \begin{bmatrix} 0 & u'_{12} & \cdots & \cdots & u'_{1n} \\ u'_{21} & 0 & \cdots & \cdots & u'_{2n} \\ \vdots & \vdots & \ddots & \cdots & \vdots \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ u'_{n1} & u'_{n2} & \cdots & \cdots & 0 \end{bmatrix}. \quad (8)$$

In the fifth step, the fuzzy total relationship matrix (T) is obtained using Equation (9). The fuzzy sum relationship matrix is denoted by T . The matrix X created in the fourth stage is converted to T . At this stage, Equations (9)–(14) are used [64]:

$$\tilde{T} = \lim_{k \rightarrow \infty} \tilde{X} + \tilde{X}^2 + \cdots + \tilde{X}^k, \quad (9)$$

$$\tilde{T} = \begin{bmatrix} \tilde{t}_{11} & \tilde{t}_{12} & \cdots & \cdots & \tilde{t}_{1n} \\ \tilde{t}_{21} & \tilde{t}_{22} & \cdots & \cdots & \tilde{t}_{2n} \\ \vdots & \vdots & \ddots & \cdots & \vdots \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \tilde{t}_{n1} & \tilde{t}_{n2} & \cdots & \cdots & \tilde{t}_{nn} \end{bmatrix}, \quad (10)$$

$$\tilde{t}_{ij} = (l''_{ij}, m''_{ij}, u''_{ij}), \quad (11)$$

$$[l''_{ij}] = X_l \times (I - X_l)^{-1}, \quad (12)$$

$$[m''_{ij}] = X_m \times (I - X_m)^{-1}, \quad (13)$$

$$[u''_{ij}] = X_u \times (I - X_u)^{-1}. \quad (14)$$

In the procedure of computing, triangular fuzzy numbers are denoted by $\tilde{f}_{ij} = (l_{ij}, m_{ij}, u_{ij})$. In addition, Equations (15)–(23) are utilized to accomplish this purpose [65]:

$$u_i^{\max} = \max u_i, l_i^{\min} = \min l_i, \quad (15)$$

$$\Delta_{\min}^{\max} = u_i^{\max} - l_i^{\min}, \quad (16)$$

$$x_{lj} = (l_{ij} - l_i^{\min}) / \Delta_{\min}^{\max}, \quad (17)$$

$$x_{mj} = (m_{ij} - l_i^{\min}) / \Delta_{\min}^{\max}, \quad (18)$$

$$x_{uj} = (u_{ij} - l_i^{\min}) / \Delta_{\min}^{\max}, \quad (19)$$

$$x_j^{ls} = x_{mj} / (1 + x_{mj} - x_{lj}), \quad (20)$$

$$x_j^{rs} = x_{uj} / (1 + x_{uj} - x_{mj}), \quad (21)$$

$$x_j^{\text{crisp}} = [x_j^{ls} (1 - x_j^{ls}) + x_j^{rs} x_j^{rs}] / [1 - x_j^{ls} + x_j^{rs}], \quad (22)$$

$$f_{ij} = l_i^{\min} + x_j^{\text{crisp}} \Delta_{\min}^{\max}. \quad (23)$$

Finally, the cause–effect relationship diagram is created by representing the data sets $\tilde{D}_i + \tilde{R}_i$ and $\tilde{D}_i - \tilde{R}_i$.

The defuzzified complete influence matrix is disclosed in the sixth stage. In this case, $\tilde{R}_i^{\text{def}}$ is the total of all vector columns, and $\tilde{D}_i^{\text{def}}$ denotes the total of all vector rows. $(\tilde{D}_i + \tilde{R}_i)^{\text{def}}$ thus determines the overall level of influence among criteria. It implies that the criterion approaches the central point considerably more closely when this value is higher. In contrast, the value of $(\tilde{D}_i - \tilde{R}_i)^{\text{def}}$ explains the strength of the causal relationship between the criteria. Accordingly, a positive result indicates that the criterion has an impact on the other criteria. In contrast, if the criterion has a negative value, it implies that the other criteria influence the criterion:

$$D_j = \sum_{i=1}^n f_{ij} \quad j = 1, 2, \dots, n, \quad (24)$$

$$R_i = \sum_{j=1}^n f_{ij} \quad i = 1, 2, \dots, n. \quad (25)$$

The fuzzy DEMATEL method has been used in many studies in the literature. Ersin et al. [66] took this method into account in determining investment criteria in local governments. Akin [67] investigated the factors that determine the career choice of business department students with the fuzzy DEMATEL method. Kabak [68] also used the analytical network process (ANP) method and fuzzy DEMATEL to prefer more qualified candidates in personnel selection. Shieh et al. [69] used this method to determine the performance criteria in the access to employment services program. Zamani et al. [70] also considered the fuzzy DEMATEL method in determining the effects of shift work, job stress and job satisfaction on occupational health. Further, on the one hand, Wang et al. [71] used an IT-2-based fuzzy DEMATEL method determining economic equality criteria and, on the other, Kalkavan et al. [72] likewise considered moral principles for sustainable economic development.

Zhang et al. [73] employed the method in the strategic mapping of youth unemployment, and similarly Kalkavan et al. [74] utilized this technique in strategies to reduce unemployment during the COVID-19 period. In addition to these studies, Dinçer et al. [75], Bhuiyan et al. [76], Dinçer et al. [77], Li et al. [78], Dinçer et al. [79] and Kuzucu Yapar and Keskin [80] have also used the fuzzy DEMATEL method in their research.

3.2. Determination of criteria

It is crucial to develop decent work opportunities for sustainable development. In this context, the decent work indicators published by the ILO are regarded worldwide. In our study, the decent work indicators specified by the ILO have been expanded by considering the vast literature. These augmented indicators were selected as decent work criteria for fuzzy DEMATEL as presented in Table 2, and 12 criteria were evaluated accordingly.

Table 2. Criteria.

DIM	Criterion	References
C1	Safe working conditions (ILO)	[10,20,22–25,44,83]
C2	Healthy workplace environment (literature)	[103,5,25,33,36,43,71,84–90]
C3	Social security system (ILO)	[10,29–32,34,91]
C4	Social dialog (ILO)	[10,27,32,34,92]
C5	Human rights and justice in workplace (ILO)	[10,29,30,33–35,92–94]
C6	Balance between work–family–personal life (ILO)	[10,22,24,25,42,43,49,50,84,94,95]
C7	Career adaptability (literature)	[36,43,49,50,56,96]
C8	Adequate earnings(ILO)	[10,22,42,44–47,97]
C9	Employment opportunities (= creation) (ILO)	[10,12,30,31,33,35,42,47,52]
C10	Labor regulation and security of work (ILO)	[10,32,35,38–40,93,98–102]
C11	Education and training system (literature)	[52,54,56]
C12	Decent working hours (ILO)	[10,22,44,93]

Note: ILO = International Labour Organization.

Table 3. Defuzzification process and weighting of criteria.

Criterion	$\tilde{D}_i - \tilde{R}_i$	$\tilde{D}_i + \tilde{R}_i$	Weight	Ranking
C1	0.1041	6.9935	0.0941	3
C2	−0.3809	7.4307	0.1000	1
C3	0.3086	6.2807	0.0845	4
C4	0.5906	5.7385	0.0772	10
C5	−0.0032	6.0607	0.0815	6
C6	−0.8420	5.9311	0.0798	8
C7	−0.3142	5.5807	0.0751	11
C8	−0.2790	5.8410	0.0786	9
C9	−0.1495	5.2301	0.0704	12
C10	0.2559	6.2469	0.0841	5
C11	0.8605	5.9764	0.0804	7
C12	−0.1509	7.0094	0.0943	2
Total	–	74,320	–	–

Note: $\tilde{D}_i + \tilde{R}_i$ = overall level of impact across criteria; $\tilde{D}_i - \tilde{R}_i$ = strength of causal influence between criteria. C1 = safe working conditions; C2 = healthy workplace environment; C3 = social security system; C4 = social dialog; C5 = human rights and justice in workplace; C6 = balance between work–family–personal life; C7 = career adaptability; C8 = adequate earnings; C9 = employment opportunities (= creation); C10 = labor regulation and security of work; C11 = education and training system; C12 = decent working hours.

These criteria determined for fuzzy DEMATEL were sent to the experts with linguistic expressions as stated in the method earlier. In the study, the opinions of four experts were used. Expert selection is very important in multi-criteria decision-making methods. In such studies, attention should be paid to the selection of the right specialist. For this reason, choosing a small number of correct experts makes the interpretation of the method results healthier [77,81,82]. The first expert has been an academican for 17 years in the field of labor economics and has national and international publications on women's employment, poverty and business policies. The second expert is a 10-year academic in the field of labor economics and has national and international publications on income distribution, wages and social policies. In addition, the most important feature of the second expert is that they took active duties in the management of the labor union in Turkey for 10 years. The third specialist has 11 years of experience in the labor and employment agency, and is still working as a consultant and manager. The fourth expert with 10 years of academic

Table 4. Cause–effect relationship.

Cause	Effect
C1	C1, C2, C3, C4 C5, C6, C7, C8, C9, C10, C12
C2	C1, C2, C3, C5, C6, C7, C8, C9, C10, C12
C3	C1, C2, C5, C6, C8, C10, C12
C4	C1, C2, C3, C5, C6, C10, C12
C5	C1, C2, C6, C12
C6	C2, C12
C7	C7
C8	C2, C6, C12
C9	–
C10	C1, C2, C3, C5, C6, C12
C11	C1, C2, C3, C5, C6, C7, C8, C9, C10, C12
C12	C1, C2, C3, C5, C6, C7, C8, C9, C10, C12

Note: C1 = safe working conditions; C2 = healthy workplace environment; C3 = social security system; C4 = social dialog; C5 = human rights and justice in workplace; C6 = balance between work–family–personal life; C7 = career adaptability; C8 = adequate earnings; C9 = employment opportunities (= creation); C10 = labor regulation and security of work; C11 = education and training system; C12 = decent working hours.

expertise in labor economics has national and international publications on social policies, employment and youth unemployment.

3.3. Findings

The fuzzy direct relationship matrix results from the fuzzy DEMATEL application stages are presented in Appendix 1, Table A1. The fuzzy normalized direct relationship matrix is also given in Appendix 1, Table A2. Additionally, the defuzzified threshold values results of the T matrix are shown in Appendix 1, Table A3. The defuzzification process ($\tilde{D}_i - \tilde{R}_i$, $\tilde{D}_i + \tilde{R}_i$) and weighting results of the decent work criteria are also presented in Table 3.

According to Table 3, the most heavily weighted decent work criterion is C2, which is defined as 'healthy workplace environment', followed by C12, which is defined as 'decent working hours'. Further, C1 is the third-ranked criterion and refers to 'safe working conditions'. As these findings are analyzed, it becomes apparent that workplace conditions, employee commitment to the workplace and job satisfaction are crucial to the formation of decent work. Moreover, reasonable working hours are among the top concerns of employees. In many nations throughout the world, working hours are governed by law. However, there are still countries in which working hours are long and unmonitored. At this point, it is deemed essential to concern working hours for decent work. Safe working conditions are one of the most fundamental human needs. Employees assess the risks of a job, such as the dangers and fatal consequences when applying for it.

Moreover, an important feature of the fuzzy DEMATEL method is the cause–effect relationships between the criteria. In other words, the outcome of which criteria a criterion affects is revealed by this method. This relationship is detected by the above-average data in the total correlation matrix. The cause–effect relationships between the criteria are presented in Table 4.

Looking at Table 4, it has been determined that criteria C1, C2, C11 and C12 are the cause for the other criteria, i.e., 'safe working conditions' (C1) is the cause of all other criteria except 'education and training system' (C11). In addition,

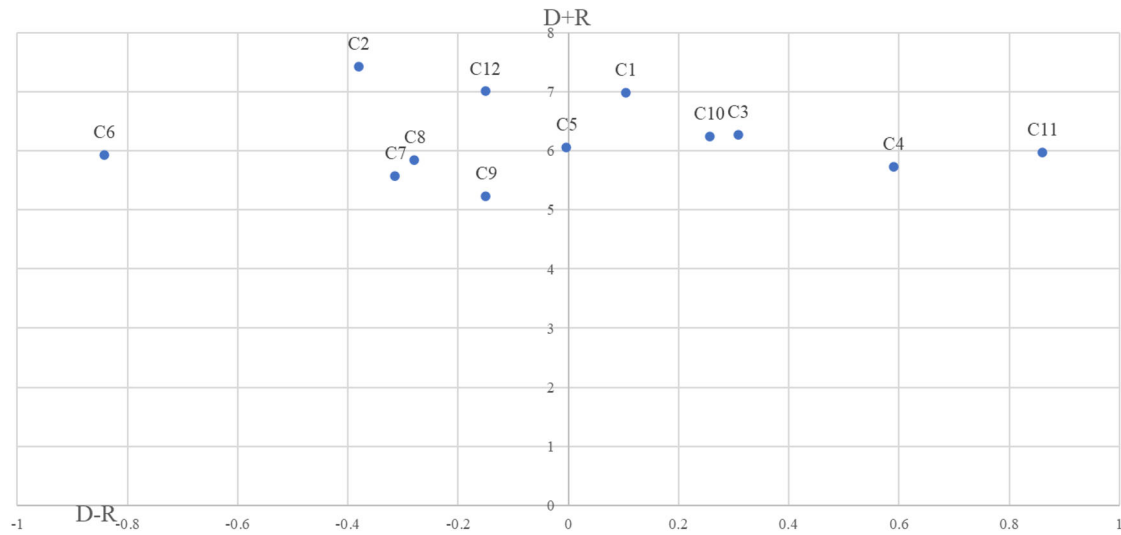


Figure 2. Impulse–response diagram. Note: $\bar{D}_i + \bar{R}_i$ = overall level of impact across criteria; $\bar{D}_i - \bar{R}_i$ = strength of causal influence between criteria. C1 = safe working conditions; C2 = healthy workplace environment; C3 = social security system; C4 = social dialog; C5 = human rights and justice in workplace; C6 = balance between work–family–personal life; C7 = career adaptability; C8 = adequate earnings; C9 = employment opportunities (= creation); C10 = labor regulation and security of work; C11 = education and training system; C12 = decent working hours.

it has been comprehended that the criterion of ‘employment opportunities (creation)’ (C9) does not affect the other criteria.

In the fuzzy DEMATEL method, the affected and affecting criteria are shown with the help of a diagram. The fuzzy DEMATEL impulse–response diagram is shown in Figure 1. $\bar{D}_i + \bar{R}_i$, one of the stabilization processes in the impulse–response chart, shows the relationship between each criterion and the other criteria. Hereunder, it is accepted that the criteria with a high $\bar{D}_i + \bar{R}_i$ value have more relationship with other criteria. In this context, it is understood that the criteria of ‘healthy workplace environment’ (C2), ‘decent working hours’ (C12) and ‘safe working conditions’ (C1) are highly correlated with other factors. In the fuzzy DEMATEL application, criteria with positive $\bar{D}_i - \bar{R}_i$ values are considered to affect other criteria highly, and criteria with negative $\bar{D}_i - \bar{R}_i$ values are evaluated as more affected by other criteria. In this context, ‘education and training system’ (C11), ‘social dialog’ (C4) and ‘social security system’ (C3) are noticed as the most affecting criteria, respectively. Further, ‘balance between work–family–personal life’ (C6), ‘healthy workplace environment’ (C2) and ‘career adaptability’ (C7) criteria were also identified as affected criteria. The impulse–response relationship map is also shown in Figure 1 to determine the direction of the effect degrees.

The criterion of ‘healthy workplace environment’ (C2), which has the highest relationship with other factors, comes to the fore in forming decent work. Organizational commitment and job satisfaction of employees in business life directly affect their productivity. Yet ‘healthy workplace environment’ may vary depending on many factors. Except for ‘career adaptability’ (C7) and ‘employment opportunities (creation)’ (C9), which are among the decent work criteria, all other criteria are effective on ‘healthy workplace environment’. For this reason, primarily governments and particularly companies and entrepreneurs should prioritize job satisfaction and engagement to create sustainable employment and decent work in any country. ‘Decent working hours’ (C12), which is determined as the second most relevant criterion, is also among the most basic indicators for the formation of decent work. Identically, the regulations made all over the world to shorten the working time support this finding. The third most related

criterion is ‘safe working conditions’ (C1), one of the top priorities for decent work. Employees consider the risks of the job when choosing a career. They prefer businesses with working conditions that minimize risk. Therefore, this criterion should also be considered a priority.

An essential feature of the fuzzy DEMATEL method is distinguishing the criteria as affecting and affected. Considering the critical findings obtained in this study, it is determined that ‘education and training system’ (C11) is the most affecting criterion. Conversely, ‘balance between work–family–personal life’ (C6) is the most affected criterion. The education system is an issue significantly related to the qualification of the job. In this context, the education system powerfully impacts other criteria. ‘Balance between work–family–personal life’ (C6) is a criterion that is affected as a consequence of decent work. In this respect, other criteria can significantly affect the work–family–personal life balance.

4. Conclusion and discussion

This study aimed to determine the impact levels of the criteria developed from the ILO and the literature to expand and disseminate decent work. In this context, in addition to the nine decent work criteria published by the ILO, three more criteria supported by the literature were added. Accordingly, the evaluations were implemented over 12 criteria. In this approach, the fuzzy DEMATEL method, a multi-criteria decision-making method, was preferred in the study.

According to the findings of the study, ‘healthy workplace environment’, ‘decent working hours’ and ‘safe working conditions’ are most associated with other criteria that aspire to contribute the decent work concept. Further, ‘balance between work–family–personal life’ has been found to be the most affected criterion, while ‘education and training system’ has been the most affecting. Hence, creating decent work is essential for the satisfaction of the qualified workforce. Employees’ commitment to work and institutions and the level of satisfaction they derive from work are vital for the sustainability of decent work. Additionally, decent working hours also come to the fore regarding the sustainability of a good job. Particularly since the COVID-19 period, some changes in the nature of work

have accelerated, and flexible working has become common worldwide.

Based on the research findings, intervention methods in the subordinate–superior relationship, time method, corporate culture and interpersonal communication are extremely important in job satisfaction and commitment to prevent loss of productivity due to workplace environments. This study therefore proposes the following strategies:

- Social work practices and community well-being should be encouraged to ensure a healthy workplace environment.
- Working hours should be reduced in such a way as to allow people to socialize with their families and themselves. Transformation to more efficient but fewer working hours should be realized. In this context, working hours should be reduced to 4 days a week or 30 working hours. Thus, it will be possible to create humane working hours and reduce unemployment.
- The factors that cause occupational injuries and damage to health should be identified within the scope of safe working conditions. Following the current affairs in occupational safety, new risk areas should be determined, and precautions should be taken accordingly to ensure the functionality of an effective control mechanism.
- For young people who are not in the education and training system, and people who cannot find a job after a certain age, theoretical and practical training should be integrated with on-the-job vocational training programs in the fields needed. Vocational training opportunities should be offered to people of all ages. The education system should be designed correctly considering the future demographic transformation, and an education model should be created based on qualified workforce planning.
- For work–family–personal life balance, maternity or paternity leave should be provided reasonably within the scope of official financial support for raising children. In addition, part-time working opportunities or home office working methods should be expanded for mothers.

Significantly, an essential feature of the fuzzy DEMATEL method is to reveal both the affecting criteria and criteria that are affected. In this context, an actual study result is that the education and training system criterion has been determined as the most influential criterion among the decent work criteria. Since an important indicator of economic development is education and training activities, good education in a country can lead to the proliferation of skilled jobs and increase the production of high-value-added products. In this context, the findings of our study also support this situation.

Another important consequence of the study is that the most affected criterion in decent work is work–family–personal life balance. An employee's lack of social support creates a negative situation in terms of work psychology. Therefore, criteria such as decent working hours, sufficient earnings, social dialog and safe working conditions can directly affect the work–family–personal life balance.

In addition, the fundamental rights and social protection arrangements (paternity–maternity leave) that countries make in their employment contracts are also critical regarding work–family–personal life balance. However, these regulations differ according to how countries implement social welfare and are further extended within the scope of decent

work in countries subject to different welfare regimes. In this context, an important outcome obtained in this study highlights expanding the legal regulations and gaining prevalence.

As the criteria discussed in this study have been evaluated in general, the scope of this study is limited. In future studies, it is strongly recommended that these criteria are regarded within the framework of the internal dynamics of the countries. Further, they should be handled comparatively on a country basis. In this regard, TOPSIS, VICKOR and MAIRCA methods, which are also multi-criteria decision-making methods, could be used for more in-depth analyses of the proposed subject.

Disclosure statement

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Appendix 1

Table A1. The initial direct relationship fuzzy matrix.

	C1		C2		C3		C4		C5		C6		C7		C8		C9		C10		C11		C12													
C1	0.00	0.00	0.25	0.63	0.88	1.00	0.44	0.63	0.81	0.38	0.63	0.88	0.56	0.81	1.00	0.38	0.63	0.81	0.31	0.56	0.81	0.25	0.50	0.69	0.38	0.63	0.81	0.75	1.00	1.00	0.31	0.56	0.81	0.56	0.81	0.94
C2	0.63	0.88	1.00	0.00	0.00	0.25	0.31	0.50	0.75	0.38	0.56	0.75	0.44	0.69	0.81	0.75	1.00	1.00	0.44	0.69	0.88	0.50	0.69	0.81	0.38	0.63	0.88	0.50	0.75	1.00	0.31	0.44	0.63	0.69	0.94	1.00
C3	0.50	0.69	0.81	0.38	0.56	0.81	0.00	0.00	0.25	0.31	0.56	0.81	0.38	0.63	0.88	0.44	0.69	0.94	0.13	0.38	0.63	0.44	0.69	0.94	0.38	0.63	0.81	0.63	0.88	1.00	0.19	0.38	0.63	0.50	0.75	1.00
C4	0.38	0.63	0.88	0.63	0.88	1.00	0.38	0.63	0.88	0.00	0.00	0.25	0.44	0.69	0.88	0.38	0.56	0.81	0.06	0.25	0.50	0.31	0.50	0.69	0.31	0.50	0.69	0.44	0.63	0.81	0.31	0.50	0.75	0.44	0.69	0.88
C5	0.50	0.75	1.00	0.69	0.94	1.00	0.31	0.50	0.75	0.25	0.50	0.75	0.00	0.00	0.25	0.50	0.75	0.88	0.25	0.50	0.75	0.25	0.44	0.69	0.19	0.31	0.56	0.31	0.50	0.75	0.13	0.25	0.50	0.44	0.69	0.81
C6	0.19	0.38	0.63	0.69	0.94	1.00	0.13	0.25	0.50	0.13	0.25	0.50	0.25	0.38	0.63	0.00	0.00	0.25	0.38	0.56	0.81	0.19	0.38	0.63	0.00	0.13	0.38	0.13	0.31	0.56	0.13	0.31	0.56	0.75	1.00	1.00
C7	0.38	0.63	0.88	0.75	1.00	1.00	0.06	0.25	0.50	0.00	0.13	0.38	0.06	0.31	0.56	0.38	0.56	0.75	0.00	0.00	0.25	0.56	0.81	0.94	0.13	0.31	0.56	0.06	0.25	0.50	0.31	0.44	0.63	0.25	0.50	0.75
C8	0.25	0.44	0.63	0.75	1.00	1.00	0.31	0.44	0.63	0.13	0.25	0.50	0.31	0.44	0.63	0.56	0.81	0.94	0.50	0.75	0.94	0.00	0.00	0.25	0.19	0.38	0.63	0.06	0.19	0.44	0.31	0.44	0.63	0.38	0.56	0.81
C9	0.19	0.38	0.63	0.25	0.38	0.63	0.44	0.63	0.75	0.31	0.50	0.75	0.31	0.44	0.63	0.19	0.31	0.50	0.19	0.31	0.56	0.25	0.44	0.63	0.00	0.00	0.25	0.13	0.25	0.50	0.50	0.75	0.94	0.31	0.50	0.75
C10	0.75	1.00	1.00	0.56	0.81	1.00	0.63	0.88	1.00	0.38	0.56	0.69	0.44	0.69	0.88	0.31	0.50	0.69	0.13	0.31	0.56	0.19	0.38	0.63	0.13	0.31	0.56	0.00	0.00	0.25	0.38	0.56	0.75	0.50	0.75	0.94
C11	0.56	0.81	1.00	0.44	0.69	0.88	0.38	0.63	0.81	0.38	0.56	0.81	0.25	0.44	0.63	0.25	0.44	0.69	0.56	0.81	0.94	0.63	0.88	1.00	0.50	0.75	0.94	0.44	0.69	0.94	0.00	0.00	0.25	0.31	0.56	0.81
C12	0.56	0.81	1.00	0.69	0.94	1.00	0.50	0.75	1.00	0.19	0.38	0.63	0.44	0.69	0.81	0.69	0.94	1.00	0.44	0.69	0.88	0.38	0.63	0.88	0.38	0.63	0.88	0.38	0.56	0.81	0.13	0.31	0.56	0.00	0.00	0.25

Note: C1 = safe working conditions; C2 = healthy workplace environment; C3 = social security system; C4 = social dialog; C5 = human rights and justice in workplace; C6 = balance between work–family–personal life; C7 = career adaptability; C8 = adequate earnings; C9 = employment opportunities (= creation); C10 = labor regulation and security of work; C11 = education and training system; C12 = decent working hours.

Table A2. The fuzzy normalized direct relationship matrix.

	C1			C2			C3			C4			C5			C6			C7			C8			C9			C10			C11			C12		
C1	0.00	0.00	0.03	0.06	0.09	0.10	0.04	0.06	0.08	0.04	0.06	0.09	0.06	0.08	0.10	0.04	0.06	0.08	0.03	0.06	0.08	0.03	0.05	0.07	0.04	0.06	0.08	0.08	0.10	0.10	0.03	0.06	0.08	0.06	0.08	0.10
C2	0.06	0.09	0.10	0.00	0.00	0.03	0.03	0.05	0.08	0.04	0.06	0.08	0.04	0.07	0.08	0.08	0.10	0.10	0.04	0.07	0.09	0.05	0.07	0.08	0.04	0.06	0.09	0.05	0.08	0.10	0.03	0.04	0.06	0.07	0.10	0.10
C3	0.05	0.07	0.08	0.04	0.06	0.08	0.00	0.00	0.03	0.03	0.06	0.08	0.04	0.06	0.09	0.04	0.07	0.10	0.01	0.04	0.06	0.04	0.07	0.10	0.04	0.06	0.08	0.06	0.09	0.10	0.02	0.04	0.06	0.05	0.08	0.10
C4	0.04	0.06	0.09	0.06	0.09	0.10	0.04	0.06	0.09	0.00	0.00	0.03	0.04	0.07	0.09	0.04	0.06	0.08	0.01	0.03	0.05	0.03	0.05	0.07	0.03	0.05	0.07	0.04	0.06	0.08	0.03	0.05	0.08	0.04	0.07	0.09
C5	0.05	0.08	0.10	0.07	0.10	0.10	0.03	0.05	0.08	0.03	0.05	0.08	0.00	0.00	0.03	0.05	0.08	0.09	0.03	0.05	0.08	0.03	0.04	0.07	0.02	0.03	0.06	0.03	0.05	0.08	0.01	0.03	0.05	0.04	0.07	0.08
C6	0.02	0.04	0.06	0.07	0.10	0.10	0.01	0.03	0.05	0.01	0.03	0.05	0.03	0.04	0.06	0.00	0.00	0.03	0.04	0.06	0.08	0.02	0.04	0.06	0.00	0.01	0.04	0.01	0.03	0.06	0.01	0.03	0.06	0.08	0.10	0.10
C7	0.04	0.06	0.09	0.08	0.10	0.10	0.01	0.03	0.05	0.00	0.01	0.04	0.01	0.03	0.06	0.04	0.06	0.08	0.00	0.00	0.03	0.06	0.08	0.10	0.01	0.03	0.06	0.01	0.03	0.05	0.03	0.04	0.06	0.03	0.05	0.08
C8	0.03	0.04	0.06	0.08	0.10	0.10	0.03	0.04	0.06	0.01	0.03	0.05	0.03	0.04	0.06	0.06	0.08	0.10	0.05	0.08	0.10	0.00	0.00	0.03	0.02	0.04	0.06	0.01	0.02	0.04	0.03	0.04	0.06	0.04	0.06	0.08
C9	0.02	0.04	0.06	0.03	0.04	0.06	0.04	0.06	0.08	0.03	0.05	0.08	0.03	0.04	0.06	0.02	0.03	0.05	0.02	0.03	0.06	0.03	0.04	0.06	0.00	0.00	0.03	0.01	0.03	0.05	0.05	0.08	0.10	0.03	0.05	0.08
C10	0.08	0.10	0.10	0.06	0.08	0.10	0.06	0.09	0.10	0.04	0.06	0.07	0.04	0.07	0.09	0.03	0.05	0.07	0.01	0.03	0.06	0.02	0.04	0.06	0.01	0.03	0.06	0.00	0.00	0.03	0.04	0.06	0.08	0.05	0.08	0.10
C11	0.06	0.08	0.10	0.04	0.07	0.09	0.04	0.06	0.08	0.04	0.06	0.08	0.03	0.04	0.06	0.03	0.04	0.07	0.06	0.08	0.10	0.06	0.09	0.10	0.05	0.08	0.10	0.04	0.07	0.10	0.00	0.00	0.03	0.03	0.06	0.08
C12	0.06	0.08	0.10	0.07	0.10	0.10	0.05	0.08	0.10	0.02	0.04	0.06	0.04	0.07	0.08	0.07	0.10	0.10	0.04	0.07	0.09	0.04	0.06	0.09	0.04	0.06	0.09	0.04	0.06	0.08	0.01	0.03	0.06	0.00	0.00	0.03

Note: C1 = safe working conditions; C2 = healthy workplace environment; C3 = social security system; C4 = social dialog; C5 = human rights and justice in workplace; C6 = balance between work–family–personal life; C7 = career adaptability; C8 = adequate earnings; C9 = employment opportunities (= creation); C10 = labor regulation and security of work; C11 = education and training system; C12 = decent working hours.

Table A3. Defuzzified threshold values of the *T* matrix.

	C1			C2			C3			C4			C5			C6			C7			C8			C9			C10			C11			C12		
C1	0.040	0.148	0.849	0.109	0.258	0.989	0.074	0.181	0.815	0.060	0.159	0.743	0.086	0.202	0.831	0.076	0.206	0.872	0.057	0.171	0.809	0.055	0.172	0.812	0.060	0.163	0.760	0.104	0.215	0.832	0.054	0.151	0.729	0.096	0.232	0.935
C2	0.100	0.228	0.908	0.054	0.178	0.907	0.063	0.168	0.800	0.060	0.151	0.723	0.075	0.190	0.804	0.113	0.240	0.880	0.072	0.184	0.806	0.080	0.189	0.814	0.060	0.162	0.757	0.080	0.191	0.821	0.055	0.140	0.704	0.110	0.244	0.931
C3	0.082	0.196	0.873	0.080	0.211	0.942	0.027	0.108	0.735	0.051	0.142	0.714	0.065	0.172	0.794	0.076	0.196	0.857	0.036	0.141	0.767	0.068	0.175	0.809	0.056	0.152	0.736	0.087	0.190	0.805	0.039	0.124	0.689	0.085	0.210	0.912
C4	0.070	0.186	0.847	0.101	0.232	0.923	0.063	0.163	0.767	0.020	0.085	0.635	0.070	0.173	0.765	0.070	0.180	0.814	0.029	0.126	0.727	0.056	0.154	0.757	0.051	0.138	0.699	0.069	0.165	0.761	0.050	0.132	0.675	0.078	0.199	0.868
C5	0.079	0.190	0.830	0.105	0.232	0.893	0.054	0.145	0.729	0.042	0.128	0.660	0.025	0.102	0.680	0.080	0.192	0.793	0.046	0.145	0.725	0.048	0.144	0.731	0.037	0.115	0.663	0.056	0.148	0.729	0.030	0.104	0.629	0.076	0.194	0.833
C6	0.044	0.135	0.696	0.098	0.206	0.784	0.031	0.104	0.616	0.026	0.089	0.555	0.044	0.120	0.626	0.027	0.100	0.637	0.055	0.135	0.643	0.039	0.121	0.636	0.015	0.083	0.563	0.032	0.111	0.622	0.026	0.094	0.555	0.098	0.197	0.747
C7	0.060	0.160	0.734	0.103	0.217	0.802	0.024	0.107	0.630	0.014	0.081	0.558	0.025	0.117	0.635	0.062	0.158	0.701	0.019	0.085	0.605	0.075	0.165	0.680	0.027	0.103	0.594	0.025	0.109	0.630	0.045	0.110	0.575	0.051	0.157	0.741
C8	0.054	0.151	0.733	0.110	0.226	0.825	0.052	0.129	0.660	0.029	0.097	0.586	0.053	0.134	0.659	0.086	0.188	0.739	0.071	0.162	0.688	0.024	0.094	0.633	0.036	0.114	0.617	0.029	0.109	0.643	0.048	0.114	0.591	0.069	0.171	0.768
C9	0.043	0.132	0.701	0.055	0.151	0.755	0.062	0.139	0.645	0.045	0.113	0.586	0.050	0.124	0.632	0.043	0.126	0.666	0.036	0.108	0.624	0.045	0.125	0.641	0.016	0.070	0.555	0.033	0.105	0.622	0.063	0.135	0.596	0.056	0.148	0.729
C10	0.108	0.228	0.858	0.099	0.236	0.922	0.089	0.193	0.778	0.058	0.145	0.678	0.072	0.181	0.765	0.067	0.182	0.803	0.037	0.138	0.732	0.046	0.150	0.751	0.035	0.127	0.687	0.032	0.114	0.707	0.057	0.142	0.674	0.087	0.213	0.873
C11	0.090	0.214	0.905	0.089	0.231	0.963	0.065	0.173	0.803	0.058	0.146	0.727	0.054	0.160	0.784	0.061	0.179	0.848	0.080	0.188	0.809	0.090	0.201	0.829	0.071	0.170	0.761	0.071	0.179	0.813	0.023	0.093	0.665	0.068	0.199	0.910
C12	0.090	0.214	0.903	0.113	0.255	0.973	0.076	0.183	0.817	0.040	0.129	0.708	0.072	0.183	0.800	0.104	0.228	0.875	0.069	0.177	0.802	0.065	0.177	0.816	0.058	0.157	0.753	0.066	0.169	0.800	0.034	0.123	0.694	0.041	0.148	0.855

Note: C1 = safe working conditions; C2 = healthy workplace environment; C3 = social security system; C4 = social dialog; C5 = human rights and justice in workplace; C6 = balance between work–family–personal life; C7 = career adaptability; C8 = adequate earnings; C9 = employment opportunities (= creation); C10 = labor regulation and security of work; C11 = education and training system; C12 = decent working hours.