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## **Prioritising employee performance evaluation indicators based on a combined FAHP-TOPSIS approach to intellectual capital development**

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**Abstract:** Today, development of intellectual capital in organisations is one of the key factors in improving business processes. In this paper, a hierarchical framework of fuzzy factors in the development of intellectual capital, the index for evaluating the performance of employees in the Municipality of East Azerbaijan province by the analytic hierarchy process, fuzzy weighted. This study was a cross-sectional and information through library research, interviews and questionnaires were obtained. Statistical community, academic specialists, and experts in human resources vice mayor of East Azerbaijan province with performance appraisal systems that sample consisted of 15 patients (samples available and qualified), respectively. The findings revealed that the indicators ability to perform tasks and updated knowledge were the most important contributors to development of human capital, good colleague relationship was the most important factor in the development of organisational capital, and the indicators client treatment and good client relationship were the most important factors in the development of relational capital. Finally it was found that the most crucial of the intellectual capital constituents was motivation which affected the most the indicators colleague treatment and good colleague relationship, influencing thereby development of intellectual capital.

**Keywords:** intellectual capital; employee performance evaluation; fuzzy analytic hierarch process; FAHP; TOPSIS.

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## 1 Introduction

In addition, with the globalisation of markets, organisations were compelled to build and sustain their competitive advantage through effort for internal production of intangible assets and capitals which are difficult to imitate (Longo and Mura, 2011). In the today knowledge-based economic era, with growing complexity of work relations, organisations can no longer by merely relying on their traditional assets meet the ever increasing demands of the current turbulent environment and remain successful (Becker et al., 2001).

The intangible assets, which were not used to be taken into the traditional performance evaluation and accounting models, over the last two decades, have been increasingly recognised as intellectual capitals by many renowned scholars and managers of successful organisations. These resources form the core assets in many organisations which serve them as a weapon to secure their very existence, so as they cannot easily ignore their potentials (Brennan and Connell, 2000). Consequently, developing methods for management and improvement of intellectual capitals has become a key strategic task for realisation of a higher organisational value.

Public or civil service organisations in Iran and many other countries are responsible for a wide range of activities, and their operation involves as well many opportunities and threats. In these organisations, the main emphasis is now being placed on customer (citizen) satisfaction and financial gains are of lower concern. Adopting a strategy focused on development of intellectual capitals in this type of organisations seems to be

the best way to achieve long-term goals. On the other hand, in order to successfully implement a comprehensive strategy for promotion of intellectual capital, an organisation needs to have the most important part of the organisation, i.e., the employees, engaged in this process (Drucker, 1993). Providing adequate and targeted feedback to employees is essential and very effective for this purpose. Without an appropriate feedback mechanism, employees would remain uninformed of the organisation expectations from them in which case they are unlikely to take any corrective action regarding their shortcomings or errors. At the designing stage of an employee performance evaluation system, care should be taken for identification and choice of performance indicators in terms of their consistency with overall organisational strategy (Armstrong and Baron, 1998).

In fact, the type and weight of these indicators signifies the organisation strategy. Considering that the previous research on the various types of workforce performance indicators is too scanty to lend itself to guide development of a plan for organisation intellectual capitals, creating a balanced system in which each indicator gets assigned a weight proportional to its significance in promotion of the strategic intent would efficiently guide the employees in the direction of organisational objectives.

This study was conducted to provide a weight assignment framework for determining the relative worth and significance of employee performance indicators in public organisations, particularly in the municipalities of East Azerbaijan province, which would help these organisations implement their intellectual capital strategies by giving them adequate and targeted feedback. The Design of a balanced system in view of multiple criteria is a multi-attribute decision method (MADM) specific issue. The fuzzy analytic hierarchy process (FAHP) and fuzzy TOPSIS (FTOPSIS) method are among the most frequently applied multiple-attribute weight assignment and ranking systems which are also utilised in the present study. This method is based on paired comparisons at different hierarchical levels carried out on a scale of 1–9 order of preferences. In the following, this paper, while giving a brief introduction to various types of intangible assets that organisations possess, discusses the three-layer intellectual capitals implementation plan and develops a fuzzy hierarchical framework for promotion of them throughout the organisation. Next, seven groups of the major employee performance criteria for the administration sections of the East Azerbaijan Municipality are identified. Further, the research methodology along with entropy and TOPSIS approach within the context of the present research are explained and the obtained numerical results from conduction of the research in a number of other Iranian public organisations are presented. The final section summarises and discusses the results. This research seeks to answer the question, so first investigated the existing literature in this field and then explained the methodology and expresses the results of research.

## **2 Literature**

A company market value is made up of its tangible assets (physical and financial resources) and intangible assets (intellectual capitals). Since the inception of researches on intellectual capitals in early 1980s, a multitude of definitions have been offered for this concept. Itami (1987) as one of the pioneers in the field considers intellectual capital in terms of special technology, customer-related information, brand name, good name and reputation, and organisational culture which are infinitely valuable for organisation

competitiveness. In some other definitions, it is described as: totality of the processes and assets which are not normally displayed in financial balances, as well as all intangible assets (including brand or trade name, monopoly right, and goodwill) which are addressed and reckoned with in advanced accounting methods. This capital incorporates the entire organisational people and operational manifestation of their knowledge (Roos et al., 1998); involving such mental aspects as knowledge, information, built intelligence, and experiences which serve to produce wealth and high value for organisation; and collective mental power and organised useful knowledge (Stewart, 1997). Cohen et al. (1993) noted that intellectual capital, like muscles in body, might lose their strength and efficiency, if not used. Most organisations utilise a small percentage of this capital for production of wealth, while many researches and entrepreneurs emphasise on its high potentials for building knowledge and creating value added (Bontis, 1996, 1998; Edvinsson and Malone, 1997; Roos et al., 1998; Sveiby, 1997). However, over recent years, there has been evidence on growing importance of intellectual capital as a source of value creation (Serenko and Bontis, 2004), a remarkable development both to practitioners and scholars. The increased appealing to this type of capital could be attributed to the increased legal actions in protection of patent rights, intensified competition characterised by high pace of production and decisive role of services experienced by enterprises on international markets, the globalisation phenomenon which has strengthened the bonds between entrepreneurs in a broadly integrated context, forcing organisations to think out and implement effective strategies for transition from local markets to the large global market, the rapid growth of information and communication technologies (ICT), and emphasis on the role of people and employees and innovative ideas which are considered critical for attaining a speedy and sustained growth.

Researchers divide intellectual capital into several categories. The intellectual capital model, which was an initial work of Sveiby (1997), breaks it down into internal assets, external assets, and market asset. Granstrand (1999) viewed intellectual capital in terms of people creativity, knowledge and identity. Edvinsson and Malone (1997) expanded on the Skandia's value scheme which divided intellectual capital into structural and human capitals. Rastogi (2003) discards the attempt for distinct and clear-cut divisions of IC dimensions; for intangible assets form an integrated whole and as such their isolation as independent and distinct elements is not conceivable. Nonetheless, he acknowledges presence of human capital, social capital, and knowledge management as determinants of intellectual capital. Classification of intellectual capital by Lu et al. (2010) presents discovery, organisational practices, and human resources as the IC constituents. In view of Muhammad and Ismail (2009), the most critical intangible resources for an organisation success are reputation, tacit knowledge, and organisational culture. Mouritsen et al. (2002) suggest human capital, organisational capital, and customer capital as the three principal constituents of intellectual capital. The proposed framework by the Danish Confederation of Trade Unions (1999) (LO) for the concept of knowledge includes people, systems, and the market. Kaplan and Norton (2001), without giving any particular classification, propose that organisation success is contingent on management of financial aspects, customers, internal processes, creativity and innovation. Notwithstanding, most of the classifications, if taken somewhat less strictly, point to human capital, structural capital (internal), and relational (external) capital as the principal constituents of intellectual capital (Canibano et al., 1999; Bontis, 1996, 1998; Sanchez et al., 2000; Roos et al., 1998; Stewart, 1997; Ordonez de Pablos, 2003). These

elements are in turn composed of smaller parts. In Table 1, a comparison is made between five other models.

**Table 1** A comparative overview of five IC-models by their components

<i>IC and its components</i>	<i>Models</i>	<i>Conrad group</i>	<i>Roos and Roos</i>	<i>Bontis</i>	<i>Mayo</i>	<i>Skandi a</i>
Human capital						
Capability and skill		✓	✓	✓	✓	✓
Loyalty and commitment			✓		✓	✓
Employee satisfaction				✓	✓	✓
Values and culture					✓	✓
Organisational capital						
Knowledge management		✓	✓	✓	✓	✓
Organisational culture				✓	✓	✓
Efficiency of organisational processes		✓	✓	✓	✓	✓
Customer capital						
Correspondence to customer needs		✓	✓	✓	✓	✓
Customer satisfaction and market trend			✓	✓	✓	✓

### 2.1 Human capital

Bontis thinks of human capital as the collective body of knowledge offered by employees of organisation, which could be moved out of the organisation by employees. It includes competencies, experience, knowledge, skills, attitudes, commitment, and wisdom of managers and employees (Hsu et al., 2007). In addition, Yolanda et al. (2011) describe human capital in universities as the amount of tacit and explicit knowledge acquired by university staff members (i.e., professors, researchers, managers, service and administrative employees) via formal and/or informal training, and relearning processes.

### 2.2 Structural capital

According to Stewart (1997), structural capital refers to the use of effective ways for collection, testing, and integration of the existing knowledge, and removal (unlearning) of the erroneous and invalid knowledge and preservation of the right and valid knowledge and dissemination thereof (Wu et al., 2012). In view of Bontis, structural capital, in contrast to human capital which is the body of knowledge, abilities, and experiences temporarily and within the working hours made available to the organisation by employees, is the existing knowledge within and in control of the organisation which remains in the organisation once employees have left the place. It belongs to entire organisation and can be reproduced and shared with others (Bontis et al., 2000). This capital would involve such facets as “processes, work flows, special methods, business development plans, IT systems, copyrights, cooperative and collaborative culture, R&D expenses” (Hsu et al., 2007), organisational culture and structure, organisational learning, operational processes, and information systems (Ramezan, 2011).

### 2.3 *Customer capital*

Chen et al. (2004) classify customer capital as marketing capability, market intensity, and customer loyalty. This view places the emphasis on the role of played by services in the causal relationship between employee satisfaction, customer satisfaction, and financial performance (Chen et al., 2004). This is the capital present in the marketing channels and the relationships that organisation builds during development of its business. In comparison to human capital and structural capital, it directly influences perceived firm value and is increasingly in the vogue as a highly promising factor. Customer capital includes such features as marketing capability, market expansion, and customer loyalty (Ramezan, 2011).

According to Bontis (1998), in an organisation with poor systems and procedures, intellectual capital as a whole would not reach its maximum potential capacity, whereas organisations with strong structural capital and well established supportive culture it allows people engagement in innovative endeavours to try new ways, experience setbacks, and learn from setbacks and failures. Structural and human capital through interaction with each other help coordinating formation, development, and utilisation process of human capital (Chen et al., 2004).

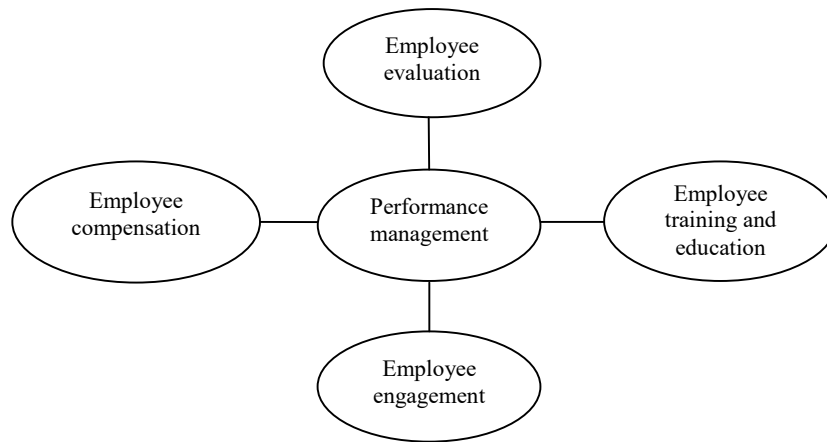
### 2.4 *Employee performance evaluation*

Evaluation and Ranking is of high importance in decisions regarding shares trading, investment and performance of organisations (Ezazi et al., 2015). Employee performance management and evaluation is one of the most essential parts of a human resource management system. Casio and Bernardino (1981) conceives performance evaluation as systematic description of individual or group performance weaknesses or strengths regarding execution of the assigned tasks. The purpose of performance management strategies is to enhance organisational effectiveness, improve employee or group productivity, and attain a higher proficiency, competence, commitment, and motivation by employees (Armstrong, 2002). Performance management is one of the organisation essential and permanent responsibilities. The produced evaluation information can either directly or indirectly be used by all the other parts of the human resource management. In this case, performance management would assume a central, integrating role regarding activities of human resource department.

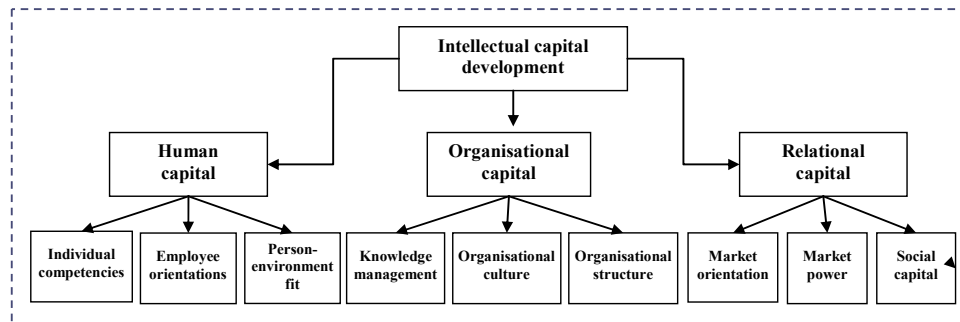
Along development of management science, numerous methods and systems were designed and developed for performance measurement and organisations gradually developed an interest in use these measures. Introduction of the modern integrated and successful approaches later on encouraged organisations to increasing replace the traditional methods with such advanced and comprehensive techniques as 360-degree Feedback. However, all these systems have one thing in common, and that is their evaluation content. By content, the type and quality of performance indicators are meant. For design of an appropriate evaluation system, an organisation needs to identify performance indicators which are determined according to the type of activities carried out by the organisation, and the rank and functions of employees. Three groups of widely known indicators applied by most of managers are *employee individual work results*, *work behaviours* and *characteristics*, and the significance of each depends on management attitude. For implementation of a strategy, it should be made sure of a consistent link between these indicators and the overall organisational objectives, which

would serve as a practical guide to help employees through the process, enabling them to perform their tasks in coordination with each other. Following study of the existing literature and several expert sessions, the seven most effective performance indicators were specified for assessment of employee performance in the administration section of the East Azerbaijan Municipality. These were: organisational and job responsibility, job competencies and adequate and updated knowledge and skill, appropriate work behaviour and good relation with colleagues (appropriate workplace conduct), appropriate client (customer) relationship, compliance with rules and regulations, creativity and innovation and flexibility.

**Figure 1** A model of integrated HR activities with performance management at the heart of it, 2002



**Figure 2** Hierarchical structure of the intellectual capital development indicators



### 3 Methodology

This research, in terms of applied purpose, regarding method of performing survey research and method of gathering data is descriptive and non-laboratorial. In present research, for prioritising employee performance, a questionnaire was composed by which weight of indicator is obtained. After confirmation of the questionnaire’s validity, its stability using inconsistency rate was found to be 0.06 which was less than 0.1 and

consequently was approved. Next, the questionnaire was distribute among 20 experts and they were asked to give their opinion regarding the question to what extent each one of the criteria should be considered effective in prioritising. Given the type, purpose, hypotheses and questionnaire of the research, one to nine-hour scale was employed to form matrix of paired comparisons, evaluate weight of indices and to rank companies using FAHP and FTOPSIS techniques. In the next step, using FAHP technique by means of Expert Choice software, the indices were assigned weight and then by FTOPSIS technique under TOPSIS (2005) software the firms were ranked. The theoretical basis for finding goals with multi-criteria decision making methods based on TOPSIS method and the entropy. This model was initially presented by Hwang et al. (1993), and with undergoing some modifications subsequently, it has become one of the best and most accurate MADMs in use among planners. This technique was founded on stronger theoretical principles relative to other comparable methods, so as many problems of methods such as the Numerical Taxonomy were resolved in the new method. According to the conceptual framework of this technique, first, the positive ideals (the most efficient state) and the negative ideals (the most inefficient state) are calculated for each indicator and then, distance of each option from positive and negative ideals is calculated. The selected option is the option which has the least distance from the positive ideals and the most distance from the negative ideals. This technique is so designed that allows controlling for the type of indicators in terms of their positive or negative effect on the end goal of decision making and including weight and significance level of each indicator in the model. For application of FTOPSIS technique for the purpose of ranking and choice of the best option from among the available options, the following steps need to be taken in succession.

Forming the decision matrix and weight assignment to indicators;

$$D = \begin{matrix} & C_1 & C_2 & \dots & C_n \\ A_1 & \left[ \begin{matrix} X_{11} & X_{12} & \dots & X_{1n} \end{matrix} \right. \\ A_2 & \left. \begin{matrix} X_{21} & X_{22} & \dots & X_{2n} \end{matrix} \right. \\ \vdots & \left. \begin{matrix} \vdots & \vdots & \dots & \vdots \end{matrix} \right. \\ A_m & \left. \begin{matrix} X_{m1} & X_{m2} & \dots & X_{mn} \end{matrix} \right. \end{matrix}$$

Quantification of decision matrix and setting up the unscaled matrix.

$$\tilde{r}_{ij} = \left\{ \left( \frac{a_{ij}}{c_{ij}^+}, \frac{b_{ij}}{c_{ij}^+}, \frac{c_{ij}}{c_{ij}^+} \right), j \in B \right.$$

$$\left. \tilde{r}_{ij} = \left\{ \left( \frac{a_{ij}}{c_{ij}^-}, \frac{b_{ij}}{c_{ij}^-}, \frac{c_{ij}}{c_{ij}^-} \right), j \in C \right. \right.$$

$$c_j^+ = \max_i c_{ij} \quad \text{if } j \in B$$

$$a_j^- = \min_i a_{ij} \quad \text{if } j \in C$$

Finding the weighted unsealed matrix (product of matrix D times relative weight of the obtained indicators from AHP method), finding the positive and negative ideals in FTOPSIS (with positive ideal being (1, 1, 1) and the negative ideal (0, 0, 0)).



$$A^+ = (\tilde{v}_1^+, \tilde{v}_2^+, \dots, \tilde{v}_k^+)$$

$$A^- = (\tilde{v}_1^-, \tilde{v}_2^-, \dots, \tilde{v}_k^-)$$

Finding distance of each indicator from ideal answers.

$$d(A_1, A_2) = \sqrt{\frac{1}{3} [(a_1 - a_2)^2 + (b_1 - b_2)^2 + (c_1 - c_2)^2]}$$

$$d_i^+ = \sum_{j=1}^k d(\tilde{v}_{ij}, \tilde{v}_j^+), \quad i = 1, 2, \dots, m$$

$$d_i^- = \sum_{j=1}^k d(\tilde{v}_{ij}, \tilde{v}_j^-), \quad i = 1, 2, \dots, m$$

Specifying relative proximity of each option, their ranking, and final selection.

$$CC_i = \frac{d_i^-}{d_i^+ + d_i^-}, \quad i = 1, 2, \dots, m$$

Maximum the  $CC_i$  of an option is, the closer it is to the ideal solution and the higher its priority becomes. In this paper, geometric means of the completed questionnaires were computed, where the geometric means of matrices, due to proximity of the comparisons of different groups to each other, had the necessary consistency. In Table 2, the summary fuzzy analysis and weights and the respective indicators (measures) are presented.

**Table 2** Summary of fuzzy analysis, weights and the respective indicators

Level	Indicators (measure)	Inconsistency rate	Relative weight	Overall weight	Rank	
2	Human capital	0.04	0.345	0.345	2	
2	Org. capital	0.04	0.096	0.096	3	
2	Relational capital	0.08	0.558	0.558	1	
3	Human capital	Individual capabilities	0.09	0.13	0.13	3
3		Employee orientation	0.10	0.72	0.72	1
3		Environmental adaptability	0.08	0.15	0.15	2
3	Org. capital	Knowledge management	0.06	0.097	0.097	3
3		Org. culture	0.00	0.558	0.558	1
3	Human capital	Individual capabilities	0.09	0.13	0.13	3
3		Employee orientation	0.10	0.72	0.72	1
3		Environmental adaptability	0.08	0.15	0.15	2
3	Org. capital	Knowledge management	0.06	0.097	0.097	3
3		Org. culture	0.00	0.558	0.558	1
3		Org. structure	0.00	0.345	0.345	2
3		Market orientation	0.08	0.426	0.123	2
3		Market power	0.04	0.012	0.012	3
3		Social capital	0.00	0.562	0.058	1

**Table 2** Summary of fuzzy analysis, weights and the respective indicators (continued)

<i>Level</i>	<i>Indicators (measure)</i>	<i>Inconsistency rate</i>	<i>Relative weight</i>	<i>Overall weight</i>	<i>Rank</i>	
4	Human capital	Individual capabilities (working experience)	0.07	0.124	0.010	20
4		(working quality)	0.07	0.334	0.036	15
4		(learning ability)	0.07	0.542	0.042	11
4		Employee orientation (motivation)	0.05	0.460	0.101	1
4		(commitment)	0.05	0.232	0.051	8
4		(behavioural pattern)	0.07	0.308	0.068	4
4		Environment adaptability (person-work fit)	0.08	0.322	0.053	7
4		(person-group fit)	0.09	0.261	0.043	10
4		(organisation-person fit)	0.06	0.418	0.068	4
4	Org. capital	Knowledge management (knowledge creation and innovativeness)	0.06	0.058	0.009	21
4		(knowledge sharing)	0.08	0.287	0.047	9
4		(knowledge application)	0.05	0.507	0.082	2
4		(information system)	0.08	0.148	0.024	17
4		Org. culture (building organisational culture)	0.09	0.258	0.025	16
4		(familiarity with org. culture)	0.04	0.742	0.073	3
4		Org. structure (quality of org. processes)	0.07	0.337	0.028	14
4		Clear communication	0.06	0.663	0.056	6
4	Relational capital	Market orientation (customer database)	0.10	0.044	0.005	22
4		(meeting customer needs)	0.09	0.493	0.061	5
4		(discerning customer needs)	0.10	0.329	0.041	12
4		(appropriate relationship with environment)	0.05	0.134	0.017	19
4		Market power (brand reputation)	0.06	0.291	0.004	23
4		(new sales channels)	0.04	0.201	0.003	24
4		(market share)	0.09	0.140	0.002	25
4		(customer loyalty)	0.07	0.368	0.005	22
4		Social capital (public image)	0.07	0.337	0.019	18
4		(social relationships/ communication)	0.04	0.663	0.038	13

#### 4 Analysing and result

The relative weight of criteria (indicators) by Shannon entropy: in these article nine main criteria to prioritise motivational factors that maintain staffing specialist with entropy and TOPSIS approach combines detected that decision matrix paired comparisons is in Table 8.

**Table 3** Matrix decision

<i>Municipality</i>	<i>Individual competencies</i>	<i>Employee orientations</i>	<i>Person-environment fit</i>	<i>Knowledge management</i>	<i>Organisational culture</i>	<i>Organisational structure</i>	<i>Market orientation</i>	<i>Market power</i>	<i>Social capital</i>
Miyaneh	3.7	5.6	6.9	5.7	4.4	3.2	2.8	3	3.8
Bonab	4.6	5.8	5.5	3.6	8.2	2.2	2.4	2.4	4.4
Marand	7.4	5.3	4.3	5.2	4.4	3	3.4	2.5	3.7
Sarab	6.7	6.5	5.6	5.5	6.4	1.6	2.8	1.7	6.4
Bostan Abad	5.5	5.2	3.2	5.7	4.4	2.8	1.8	2.5	5.5
Kleibar	5.2	6.7	3.3	5.3	5.8	4.1	2.1	3	4.7
Shabestar	4.6	7.2	5.3	7.7	6.3	2.7	2.5	2.5	5.4
Tabriz	6.3	5.5	7.9	6.8	4.3	3.6	4.1	3.7	5.5

**Table 4** Normalised decision matrix

Sum of the column	15.8947	17.0106	15.4706	16.3966	16.0655	8.4581	7.9819	7.6870	14.1492
<i>Municipality</i>	<i>Individual competencies</i>	<i>Employee orientations</i>	<i>Person-environment fit</i>	<i>Knowledge management</i>	<i>Organisational culture</i>	<i>Organisational structure</i>	<i>Market orientation</i>	<i>Market power</i>	<i>Social capital</i>
Miyaneh	0.2327	0.3291	0.4459	0.3476	0.2737	0.3782	0.3505	0.3899	0.2685
Bonab	0.2893	0.3409	0.3555	0.2195	0.5103	0.2599	0.3003	0.3119	0.3109
Marand	0.4654	0.3115	0.2779	0.3171	0.2738	0.3546	0.4256	0.3251	0.2614
Sarab	0.4215	0.3821	0.3620	0.3354	0.3984	0.1892	0.3508	0.2212	0.4523
Bostan Abad	0.3460	0.3057	0.2068	0.3476	0.2739	0.3310	0.2255	0.3252	0.3887
Kleibar	0.3523	0.4471	0.2596	0.3544	0.4427	0.5452	0.2964	0.4500	0.3642
Shabestar	0.2894	0.4233	0.3426	0.4696	0.3921	0.3192	0.3132	0.3252	0.3816
Tabriz	0.3964	0.3233	0.5106	0.4147	0.2677	0.4256	0.5137	0.4813	0.3887

**Table 5** Motivational factors influencing weight In order to maintain staffing specialist

<i>Entropy method</i>	<i>Individual competencies</i>	<i>Employee orientations</i>	<i>Person-environment fit</i>	<i>Knowledge management</i>	<i>Organisational culture</i>	<i>Organisational structure</i>	<i>Market orientation</i>	<i>Market power</i>	<i>Social capital</i>
EJ	1.384	1.402	1.365	1.388	1.373	1.359	1.376	1.381	1.393
DJ = 1-EJ	0.384-	0.402-	0.365-	0.388-	0.373-	0.359-	0.376-	0.381-	0.393-
WJ = $\sum DJ$	0.112	0.117	0.107	0.113	0.109	0.105	0.110	0.111	0.115

### 3 Ranking the East Azerbaijan municipalities in terms of the IC development indicators using FTOPSIS

Following FTOPSIS steps, the positive and negative ideals for each attribute, and distance of the options from the both ideals were determined. Subsequently, by calculating the index of proximity to ideal for each option, the municipalities were ranked based on the obtained scores. In Tables 6–8, the FTOPSIS procedures and results are presented where the decision matrix and the unsealed matrix are determined based on nine attributes and eight options (municipalities) ranked using MS Excel.

Given the nine indicators and the obtained results from TOPSIS, priority of each option was determined according to which municipalities Tabriz, Shabestar, and Miyaneh with getting assigned the most weight weights are ranked the first, second and third priorities, as presented in Table 6–8.

**Table 6** UN scaled decision matrices

<i>Municipality</i>	<i>Individual competencies</i>	<i>Employee orientations</i>	<i>Person-environment fit</i>	<i>Knowledge management</i>	<i>Organisational culture</i>	<i>Organisational structure</i>	<i>Market orientation</i>	<i>Market power</i>	<i>Social capital</i>
Miyaneh	0.233	0.329	0.446	0.348	0.274	0.378	0.351	0.390	0.269
Bonab	0.289	0.341	0.356	0.220	0.510	0.260	0.301	0.312	0.311
Marand	0.466	0.312	0.278	0.317	0.274	0.355	0.426	0.325	0.261
Sarab	0.422	0.382	0.362	0.335	0.398	0.189	0.351	0.221	0.452
Bostan Abad	0.346	0.306	0.207	0.348	0.274	0.331	0.226	0.325	0.389
Kleibar	0.327	0.394	0.213	0.323	0.361	0.485	0.263	0.390	0.332
Shabestar	0.289	0.423	0.343	0.470	0.392	0.319	0.313	0.325	0.382
Tabriz	0.396	0.323	0.511	0.415	0.268	0.426	0.514	0.481	0.389

**Table 7** Weighted unscaled matrices

<i>Municipality</i>	<i>Individual competencies</i>	<i>Employee orientations</i>	<i>Person-environment fit</i>	<i>Knowledge management</i>	<i>Organisational culture</i>	<i>Organisational structure</i>	<i>Market orientation</i>	<i>Market power</i>	<i>Social capital</i>
Miyaneh	0.026	0.039	0.048	0.039	0.030	0.040	0.039	0.043	0.031
Bonab	0.032	0.040	0.038	0.025	0.056	0.027	0.033	0.035	0.036
Marand	0.052	0.036	0.030	0.036	0.030	0.037	0.047	0.036	0.030
Sarab	0.047	0.045	0.039	0.038	0.043	0.020	0.039	0.025	0.052
Bostan Abad	0.039	0.036	0.022	0.039	0.030	0.035	0.025	0.036	0.045
Kleibar	0.037	0.046	0.023	0.037	0.039	0.051	0.029	0.043	0.038
Shabestar	0.032	0.050	0.037	0.053	0.043	0.034	0.034	0.036	0.044
Tabriz	0.044	0.038	0.055	0.047	0.029	0.045	0.057	0.053	0.045

**Table 8** Distance of options from the ideal

<i>Municipality</i>	<i>CL</i>	<i>+d-+d</i>	<i>+d</i>	<i>-d</i>	<i>Priority</i>
Miyaneh	0.450	0.094	0.052	0.043	3
Bonab	0.384	0.093	0.057	0.036	7
Marand	0.443	0.095	0.053	0.042	6
Sarab	0.448	0.096	0.053	0.043	4
Bostan Abad	0.329	0.093	0.062	0.031	8
Kleibar	0.446	0.097	0.053	0.043	5
Shabestar	0.500	0.090	0.045	0.045	2
Tabriz	0.678	0.100	0.032	0.067	1

Note: The model ranking based on TOPSIS method.

## 5 Discussion

In this paper, new and operational entropy and TOPSIS-based framework was provided by which the key employee performance indicators are assigned weights and prioritised for their role in IC development in the target organisations. This framework allows identification and assessment of the most suitable employee performance indicators by organisation managers, especially human resource managers, who seek sustainable development through making investments on non-financial resources, according to the internal contingencies (organisation size, type of activity, structure, wishes of shareholders, etc.) and those of the external conditions (market, competitors, partners, government, etc.). They may by applying these weighted indicators in performance evaluation system give shape to a kind of contract in the mind of managers and employees, leading to integrated and collectively shared goals and performance of all the organisational members and giving the employees the necessary incentives to move in direction of the organisation’s objectives. The obtained results from implementation of

this framework can be used in all kinds of performance evaluation systems, such as the 360-degree feedback. For the human mind, immediate comprehension of large scale, complex phenomena is normally difficult or impossible. Hence, breaking down a large, complex problem into its constituting elements by means of a hierarchical structure would help human understanding of such phenomena. Due to large extent and high complexity of the proposed model, it is made use of FAHP method which for analysing the complex problems follows patterns analogous to those of human brain. The FTOPSIS method is used for ranking of the province municipality. Due to abstraction of the used indicators, and unavailability or difficulty of extraction of exact information regarding the assessment indicators, as well as preferences of the decision makers for use of verbal explanation in place of numerical quantities in comparisons, it might be better the fuzzy version of AHP to be used for the model execution.

Despite the high competencies of FAHP in multi-criterion issues, one of the drawbacks of this method is the high volume of the questionnaire requiring much care and time on the part of the experts which would otherwise render the comparisons highly inconsistent and unacceptable. In particular, increased number of choices in the lowest level of the hierarchy leads to an exponential rise in volume of the questionnaire's items in which case, other MADMs, such as SAW or ELECTREE, had better be used. In this research, in order to avoid this problem, using classification, the number of performance indicators was reduced to 9. Obviously, to obtain more accurate information, Maximum number of indicators can be taken into account. Another point in this study was presence of a AHP expert in each group when completing the questionnaire. The expert role is to guide and resolve ambiguity regarding the indicators which of course could affect opinion of the group members. Because, in absence of an expert, the obtained results from the groups could significantly vary in which case mean value of the matrices would lack the necessary consistency.

## **6 Conclusions**

This research, based on a combined entropy and TOPSIS approach, investigated and prioritised employee performance indicators for the ultimate purpose of IC development in the East Azerbaijan Municipality. However, the use of the method in the context of public (civil) organisation would not imply inefficiency of the proposed model in other settings or types of organisation, and it is easily and flexibly applicable to both manufacturing and service organisations. Considering the numerical findings in this research, one might derive a relative conclusion about the performance indicators, since presence of certain interfering variables such as organisation culture, size, and structure pose limitations on the extent of its generalisation to all types of organisations. Therefore, further research is required in support of these results and for conclusive inferences hereon. The obtained numerical results from implementation of the above model in the mentioned municipality suggested relational and human capitals as the most important elements of the intellectual capital in the civil organisations, whereas organisational capital, despite its undeniable important in this type of organisations, was found to be of less significance.

One reason for such relatively low significance of organisational capital could be the monopoly exercised by these organisations in the provided services, so as no competition against them is conceivable. For instance, market power as one of the main components

of relational capital receives a very trivial share of overall efforts in this type of organisation which is primarily ascribable to lack of competitiveness. This, in less degree, is also the case with two other components of the relational capital. Comparison of the third level elements reveals the highest importance of the employee orientation (attitude). In fact, since orientations manifest employee's operational opinion and inclination, they play a crucial role in IC development and organisation success, which appear to be also true in other organisations. The most essential part of the employee orientations is the employee motivation as the most important subscale of intellectual capital. Employee behavioural patterns and commitment are ranked next as less important. The second important factor at level 3 is organisational culture which confirmed the author's views favouring inclusion of this attribute in the model. One of the novelties the present model can be credited for relates to this aspect which had not been recognised in previous models of human and intellectual capitals development, and this research provides evidence on the necessity of addressing this category of intellectual capital. The third factor was social capital which as a mechanism serves for better running of operation and achieving sustainable success.

The most important types of fitness were person-organisation fit, person-job fit, and person-group fit. The next factor at the third level was market orientation, in the sense that this kind of organisation needs to pay special attention to their clients and by identifying (characterising) different clientele groups try to find out about their needs and wishes and customise their services according to needs and wishes of each clientele group. Maintaining appropriate professional relationship with other public organisations is also of high importance to organisation success. Among the subsets of these elements, acquaintance of employees with organisation culture was found to be of relatively higher significance, so as at the fourth hierarchical level was ranked third after motivation and use of knowledge.

In fine, from the final comparison of the evaluation indicators presented in Table 2 it was found that in general for human capital development, the indicator ability to perform the job (tasks) and updated skill and knowledge (updated technical know-how) was the most crucial factor, and the next important factor was the employee organisational, job-related accountability. For development of organisational capital, special emphasis should be placed on appropriate relationship between employees and ability to perform the tasks and updated knowledge in performance evaluation. For promotion of the third component of intellectual capital, relational capital, the two indicators employee good customer relationship and flexibility were found to be the most important. In sum, the results of this research prioritise the indicators ability to perform the tasks; accountability; flexibility; good relationship with colleagues; compliance with rules and regulations; good customer relationship; and creativity and innovation, respectively, as the most important factors in the intellectual capital development process.

### *6.1 Suggestion*

The general implication is that organisations for improving their performance and achieving superiority and excellence in this regard need to strengthen their intangible capitals. investments in human capital development through well-managed and well-organised employee training and empowerment programs in various specialised and generic areas, transforming the workforce into knowledge-workers, improving communication and interaction processes between superiors and subordinates, and

improving structural capital by creating a culture and climate that encourages and promotes collective learning and teamwork in organisation. Based on the research findings and theoretical background, the following practical suggestions are made:

- in the intangible organisational capitals management and development process, these capitals and knowledge assets should be first identified and assessed in order to have a clear picture of its current state
- next, based on the initial assessment, estimation should be made of the required investments, the areas of investments, and prioritisation thereof, and even financing sources and budgeting
- further, the necessary programs, such as different training programs for young managers and executive officers need to be considered and implemented.

## 6.2 Limitation

There are some limitations during our research conduction including:

- the differences in the respondents' perception of the questioner items
- the prolonged time due to doing research and collecting data.

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