
COMPETENCY MODEL AS A TOOL FOR NETWORK ECONOMIC SYSTEM HR SUSTAINABILITY ASSESSMENT¹

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Purpose: the main purpose of this paper is the development of tool for network economic system HR sustainability assessment. *Discussion:* while training process may affect both central and certain elements' HR sustainability, it is important to take employee assessment results into account. Also for some companies taking line staff into account can have high priority because it has big impact on operations efficiency, so HR sustainability assessment tool should be effective both for management and line staff assessment. *Result:* we consider competency model and employee profile based on it as a tool. This model has two aspects: static and dynamic. While static aspect can represent actual element's potential, dynamic can be considered as indicator of this potential maintaining possibility. To be effective tool should be used both for sustainability assessment and staff training. Single employee profile dynamics' analysis can be effective for training process, group profile (profile of element) dynamics' analysis can be effective for sustainability assessment. To make this assessment automated and enhance its efficiency further research is required.

Keywords: network organization, organization sustainability, competency model, line staff assessment, employee dynamics.

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Introduction

Nowadays due to economic globalization the boundaries between the national economies of different countries are erasing, which leads to enterprises interaction establishing. In the same time internal economies grows too, which makes organizations develop into network organizations. And when it comes to international level, huge network economic systems appear.

Speaking about management of these systems, needed to note that such parameter as sustainability must be taken into account. «The sustainability of

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organization must be considered ... in linking the sustainability of one operating entity with the over sustainability of organizations as a product complex» (I.V. Polukhina, 2017) [10]. Thus, for sustainability assessment it's required to consider sustainability of network in common, sustainability of each single element and sustainability of central [3].

Since sustainability is reachable when organization has enough resources for maintaining optimal state of operations in each its aspect of activity, to get stability level every aspect should be assessed. It requires to conduct research on each aspects' effort for common or certain stability, and aspects' mutual influence.

Although this era involves digital globalization and, thus, automation «as much as possible», human resources doesn't lose its importance. So it can be said that today one of the most important aspects in network systems is human resources (HR).

When it comes to network organizations, HR can be considered as difficult aspect due to amount of work has to be conducted by HR department: recruitment, assessment, training, etc. Thus, stability of HR cannot be determined via some single parameter, it requires complex assessment of different field of actions.

The main goal of this paper is to embrace such HR process as training. Completion of next tasks is expected to make a contribution to network sustainability research:

1. Development of line employee assessment tool which can allow employee professional grow monitoring.
2. Development of single element's dynamics monitoring tool based on assessment tool.

Sustainability based on HR

Previously, the integral indicator S_i was developed for assessing the integration sustainability of a networked economic system [4]:

$$S_{int} = f(S_{el}, S_c), \quad (1)$$

where S_{el} – indicator of «basic sustainability» of single network's element; S_c – aggregate indicator of central element's sustainability; f – function which determines additive value for separate sustainability indicators S_{el} and S_c .

Speaking about HR sustainability there can be distinguished two interconnected aspects of this sustainability:

1. HR sustainability of single network element.
2. Sustainability of HR department which is part of central element.

HR sustainability of single network element can be determined with such parameters of this element as staffing level, staff turnover, staff training level etc.

HR department sustainability can have the same rules of determination as for single element. Also it is affected with aggregate level of parameters among all network elements or some of their combination.

For example, staff training level will represent how good element operations

performance can be on one hand. On other hand, it will represent efficiency of trainers' work. So low training level will be represented as low sustainability of network element cause low-qualified employees can be dismissed, which will lead to low staffing level and high staff turnover. In the same time, it will be represented as low sustainability of training department (which can be considered as part of HR sometimes) because it doesn't function effective enough, especially if some number of elements has problem like this. In advance, it can be represented as the risk of low sustainability of recruit due to risk of dismissing's high level.

But in some economic fields line staff can have strong impact on operations efficiency. For example, quality of service is important for such parameters as guest satisfaction and repeat-patronage intentions in food service [5, 8, 12]. Also quality of waiters training can affect guests waiting time. Long waiting time, on its turn, can affect restaurant revenue [2]. So sometimes sustainability assessment has to take into account both management and ground staff training level.

Hereby, provision of line staff training sustainability may affect HR sustainability in common. In the same time sustainable training can provide organizations with high qualified employees, which will increase potency of network elements if there're no critical conditions for staff turnover.

Thus some method for HR sustainability assessment has to be developed taking into account some characteristics of network economic systems:

1. Each element has some number of management employees and line employees. And line employees have to be taken into account during assessment.

2. Immature systems are usually can be considered as growing, so number of elements and, thus, number of line employees will grow. In this case assessment method should not be resource-intensive or have high rate of resource cost increasing in dependency of elements number.

3. Departments in big systems can have regional division. Thus, method should allow to separate assessment according to this division.

Competency model and employee profile

Since employees' training quality can affect HR sustainability, competence model was developed for assessing both aspects [1, 9].

Competence model represents a weighted graph:

$$G = (V, R), \quad (2)$$

where $V = \langle P, Q, C \rangle$ is a set of vertices of the graph:

$P = \{p_i\}$ – positions, $i = 1..N_P$;

$Q = \{q_j\}$ – competencies, $j = 1..N_Q$;

$C = \{c_k\}$ – competence components; $k = 1..N_K$;

$R = \{\{r_{ij}\} \cup \{r_{jk}\}\}$ – a set of edges describing the connections between the vertices.

Each vertex of graph has level (respectively L_{pi} , L_{qj} , L_{ck} for position,

competence and component). This level represents how good some entity is mastered by an employee.

Since main goal of this research is sustainability assessment based on employees' training efficiency dynamic, competence components layer becomes more important than other elements. There're three reasons for that:

1. While different components may affect the same competence, multiple components dynamic change in the same time may lead to absence of dynamic for competence. For example: one component grows while another is falling, both components affect the same competence with about the same effect. In this case dynamic change of one component will be compensated with different type of dynamic of another.

2. Analysis of components levels can give more information about employee's weak points, so training staff will be able to plan training events more accurately to prevent losing time for unnecessarily courses.

3. Since components levels can give more information, director of network element can detect the most unreliable employees using their competency model's data in combine with components priority list. In other words, the most important competence components which need high priority focus can be determined.

While bottom layer of model can be used for sustainability assessment, the middle and top ones can affect decisions making in talent pool forming. This aspect of model can be realized with reforming model by adding different positions vertices and doing «model's ascension». Model's ascension means calculating proficiency level of employee for different positions based on his abilities and knowledge, and competences requirements for these positions.

Competency model becomes the base element of an employee profile. In total, there're three elements of this profile:

1. Personal data (full name, location of work, position, experience, etc.).
2. Competency model's data (preferably data from only bottom layer and competence vertices without components linked to).
3. Older versions of competency model's data.

There should be said that storage of only bottom layer is preferred due to technical aspects of model realization. If competences requirements' or component levels' update period is relatively low, process can be more optimized by separately storing of model structure and receiving middle and top layers' data by request in real time. This principal will prevent high amount of calculations during profile update.

So, an employee profile contains both static and dynamic elements. Both of them can be used for sustainability assessment. Static element determines ability of element to provide high quality service here and now. Dynamic element determines possibility of falling service quality during some period.

Filling profile with data

Competency model requires regular update to have high uptime of data

relevance. There should be noted that network economic systems have huge amount of line employees, so they will need methods of staff assessment with low rate of resource cost growth in dependency of assessed employees count. Testing can be one of this methods [11].

While testing has some critical disadvantages like low reliability (employee can cheat) and lack of results informativeness, this method doesn't require high amount of resources [6, 7]. Testing can be easily automatized, thus, it can be easily used for assessment of big amount of employees.

Such components of model as «knowledge of something» can be filled with testing results. But some preparations should be conducted.

Firstly, company has to make list of important knowledge categories for each position that will get employee profile.

Secondly, number of questions has to be determined for each category. It is important to keep in mind such parameter as «the cost of mistake». This parameter means the rate of level decrease in case of making one mistake during testing.

Thirdly, while questions have to be balanced according to number of categories and cost of mistake, number of questions in single test should not be high, cause tests with high amount of quests will lead to negative feedback from employees.

Competences' components' levels L_c in the model are determined by dividing number of right answers A with total number of questions T bound to certain category linked to component:

$$L_c = \frac{A}{T}. \quad (3)$$

Sustainability assessment based on both aspects of profile

When profile is filled with data, it's time to start sustainability assessment. As was mentioned before, model has both static and dynamic aspects. And each aspect can represent some sustainability aspects.

In common, high priority components levels and total testing results can be used for representation of element's potential to provide high level service quality. If level of staff knowledge is low, there're will be low possibility of providing enough quality of service. Low quality of service can lead to loss of element's income, so this element can be considered as low-sustainable.

When it comes to dynamic, it will not represent element's potential at the same level as static, but it will represent risk of potential loss. If knowledge levels were bad before and increased in short period, this levels can decrease in close future because employee could get new knowledge right before testing. That means they will have to strengthen their «fresh knowledge». Also employee could cheat during testing, which would decrease model reliability.

On other hand, there can be reverse case when knowledge level decreases in short period. That can be expected in case of high staff turnover,

in other case knowledge base update rate should be considered too. If it has been updated recently, decrease can be represented as reaction to update: employees need more time to learn new information. In other case this can be represented as lack of certain knowledge that was not detected before because single testing cannot embrace whole knowledge base. So decrease in short period can be considered as an indicator of element that has some troubles with performance in that moment but it is able to fix them because it has high level before. Further assessment will provide more information like as if this element needs help.

Also there can be third case: unstable level. That means both increase and decrease are appear in short period. This case cannot be simply represented due to its different reasons, but any representation will be negative.

To realize dynamic aspect of model, assessment of knowledge should be periodic. Period should not be so long so levels of model will become non-actual soon after assessment. In this method of assessment dynamic has these parameters:

1. Character of dynamic – increase, decrease or instability.
2. Power of dynamic – weak or strong.
3. Training potential – has employee reached peak of level.

It should be kept in mind that taking training level into account during sustainability assessment requires appropriate quality of training process. In other words, if there're some analysis methods based on multiple parameters are used, methods of training should have ability to use these parameters too. So information provided by employee profile should be effective both for sustainability assessment and staff training processes.

Therefore, all of these parameters have to be translated to some useful information not only for sustainability assessment expert. Each parameter has to be bound to some model parameters:

1. Number of assessment events should be determined for dynamics analysis.
2. Character of dynamics is determined by difference between last result and first one. Stability is determined by differences between intermediate results.
3. Power of dynamics is determined by difference between last result and first one too. But if dynamics' character requires only information if this difference more or less than zero, power does take into account value of this difference.
4. Training potential is determined by last result.

Since each category of knowledge can have different cost of mistake, breakpoints for parameters have to be chosen by taken this parameter into account. Next example of dynamic assessment model is based on 5-questions category.

1. Three testing results (full period – 3 months with 1 testing per month).
2. Character of dynamics: 0.4 and more for strong instability, 0.2 for weak

one. So 1 mistake in middle test or first and last ones combined will not lead to conclusion like «this employee is quite unstable».

3. Power of dynamics: 0.2 means «weak», 0.4 means «moderate», more than 0.4 means «strong».

4. 1 for «training completed», which means employee should not make any mistake to be considered as trained.

Finally, when dynamic assessment model is settled and enough data is collected it comes to post-assessment actions.

Dynamic of single employee usually can be used by network element's trainer or someone who is responsible for training. It has to be mentioned that priority of actions cannot be unified because some knowledge categories can require actions asap in case of instability while another will require that in case of strong decrease.

Dynamic of network element in total requires extra actions conducted to models' data.

1. Each dynamic parameter's source has to be aggregated and get min, max and average values.

2. One of aggregated types has to be chosen for conclusion making.

3. If average (which is preferable) is chosen, breakpoints should be changed in accordance with number of employees of element.

When these requirements fulfilled, assessment expert can make conclusions about network or its element sustainability based on elements profiles dynamics. But they need some preparations to conduct that: they need to understand how categories of knowledge affect operations and how these categories assessment does work.

Conclusion

Competency model and employee profile as a tool for network economic system sustainability assessment was presented in this paper. This tool can also be used for training processes, but requires a lot of actions and rules for data analysis and decision making.

Decision making and sustainability assessment can use the same priority rules for dynamics as training actions in single element. While dynamics conclusions can be used by an expert for sustainability assessment, automated assessment based on formulas and numbers requires numerical methods and values respectively. To provide automated HR sustainability assessment for network economical system next requirement should be fulfilled:

1. Transferring dynamic assessment to numeric value – stability index that can be translated in about the same way as analysis of dynamics parameters.

2. Method for both individual and group analysis via stability indicator.

3. Adapting method to systems with regional division: how to understand which elements group is more important and, thus, has more impact on sustainability.

Speaking about group profile analysis, since breakpoints for average values has to take into account such conditions as «how many employees' decrease enough for problem warning», «should increase and decrease dynamics be divided», breakpoint determination rules require additional research. Even with stability index developed «conclusion making» based on dynamics parameters can be still important cause it can be used in training process by an expert with higher efficiency than stability index due to information representation ease.

Since one aspect of organization activity may affect another, research of HR stability influence on other aspects is required too.

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КОМПЕТЕНТНОСТНАЯ МОДЕЛЬ КАК ИНСТРУМЕНТ ОЦЕНКИ КАДРОВОЙ УСТОЙЧИВОСТИ СЕТЕВОЙ ЭКОНОМИЧЕСКОЙ СИСТЕМЫ¹

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Цель: основной целью данной статьи является разработка инструмента для оценки кадровой устойчивости сетевой экономической системы. *Обсуждение:* процесс обучения может повлиять как на центральный, так и на отдельные элементы кадровой устойчивости, поэтому важно принимать во внимание результаты оценки сотрудников. Кроме того, для некоторых компаний учет линейного персонала может иметь высокий приоритет, поскольку он оказывает большое влияние на операционную эффективность, поэтому инструмент оценки устойчивости персонала должен быть эффективным для оценки как менеджмента, так и линейного персонала. *Результат:* мы рассматриваем модель компетенций и профиль сотрудников на ее основе как инструмент. Эта модель имеет два аспекта: статический и динамический. В то время как статический аспект может представлять фактический потенциал элемента сети, динамический можно рассматривать как индикатор возможности сохранения этого потенциала. Чтобы инструмент был эффективным, его следует использовать как для оценки устойчивости, так и для обучения персонала. Анализ динамики профиля отдельного сотрудника может быть эффективным для процесса обучения, анализ динамики профиля группы (профиля элемента сети) может быть эффективным для оценки устойчивости. Чтобы автоматизировать эту оценку и повысить ее эффективность, необходимы дальнейшие исследования.

Ключевые слова: сетевая организация, устойчивость организации, модель компетенций, оценка линейного персонала, динамика сотрудников.

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