Improving The Effectiveness Of The Information Module For The Interaction Between Universities And Employers

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RELEVANCE

The current level of the information technologies, economy digitalization development indicates the need to improve the system of interaction between universities and enterprises, which are potential employers of graduates. The urgency of the problem reinforces the need of enterprises for the prompt selection of specialists who satisfy the required level of competencies. The authors proposed the information module «University plus Employer», which interacts with students, graduates and employers. Based on the methodology of system analysis, quality systems, methods for evaluating technical and economic efficiency, the approach to evaluating the integral indicator of module efficiency at the design stage (according to functional indicators) and at the operation stage (according to operational indicators) is offered. The possibility of developing and implementing the new information module “University + Employer” is confirmed by an increase in the integral quality indicator by functional indicators by more than four times.
Systematization Of Parameters Characterizing Module User Satisfaction

In the general case, the integral indicator (coefficient) of quality ($K_i$) of a new product compared to a product - an analogue is determined by the formula:

$$K_i = \frac{\sum_{i=1}^{n} a_i b_{ih}}{\sum_{i=1}^{n} a_i b_{ia}}$$

(1)

where $n$ is the number of product parameters; $a_i$ - weight coefficient of the $i$-th parameter importance; $b_{ih}$ and $b_{ia}$ are the values of the $i$-th parameter characterizing the quality of the new product and the analog product, respectively, estimated by experts in points.

The effectiveness of the EIEE module «University + employer» is affected by:
- target parameters that determine the functional purpose of the module;
- parameters that characterize the efficiency at the operation stage.
The first group determines the functional purpose of the module at the stage of its development (in the preparation of technical specifications). It is recommended to group these parameters in 4 blocks depending on the module users: applicants - university students, applicants - university graduates, employers, administrators.

1) Features of the module for applicants - university students:

• automatic completion of the applicant (university student) resume, formed from previously entered data in the electronic educational environment of the university;

• all current vacancies view;

• search for vacancies by company name;

• search for vacancies by position;

• search for vacancies according to specified criteria (salary level; part or full time, etc.);

• search for vacancies by keywords;

• automatic applicant notification about current vacancies by e-mail;

• view of a list of employers offering internships and practice.
2) **Features of the module for applicants - graduates of the university:**

- assignment of the status of "Graduate" to the student of the university who is using EIEE, after successful completion of his studies, and ensuring authorization in EIEE in a new status;
- preservation of the graduate autoresume for one year after graduation (after this period, autoresume is not displayed when searching for relevant resumes, access to the system in the status of "Graduate" is prohibited). At the request of the graduate after 1 year from the date of graduation, it is possible to extend his access to the module "University + Employer" (including on a contractual basis), the graduate is notified of this opportunity by e-mail
- all current vacancies view;
- search for vacancies by company name;
- search for vacancies by position;
- search for vacancies according to specified criteria (salary level; part or full time, etc.);
- search for vacancies by keywords;
- automatic applicant notification about current vacancies by e-mail.
3) **Features of the module for employers:**
- filling out the application form for a vacancy and placing it in the program;
- removal of irrelevant vacancies;
- view all resumes of applicants.
- automatic notification of the employer about the sent resumes;
- automatic notification of the employer about the appearance of new resumes that meet the criteria of the employer.

4) **The advantage of the “University + Employer” module from the point of view of employers includes access to the graduate’s portfolio, which contains information about his achievements, including scientific ones.**

5) **Features of the module for administrators:**
- providing access to editing, deleting, etc. of information in the application and resume;
- filling out an application on behalf of the employer;
- removal of inactive vacancies;
- receiving information about the application from the employer by e-mail, its moderation;
- extending the access of the applicant to the module "University + Employer".
The second group of parameters characterizes the efficiency at the operation stage as a function of time $t$:

- the number of users $N(t)$ divided by the number of university students - module users interested in finding employment, $Ns(t)$; the number of university students - module users interested in completing the internship, $Nsp(t)$; the number of university students - module users interested in completing an internship, $Nss(t)$; university graduates interested in finding employment $Na(t)$; employers, $Nw(t)$; the number of vacancies, $Nv(t)$; the number of offers for practical training, $Npp(t)$; number of internship offers, $Nps(t)$.
- the number of satisfied vacancies, $Nu v(t)$;
- the number of satisfied applicants, $Nu s(t)$;
- the percentage of satisfied vacancies, $Pu v(t)$ is determined by the formula:
  $$Pu v(t) = \frac{Nu v(t)}{Nv(t)},$$
- percentage of satisfied applicants, $Pu s(t)$ is calculated by the formula:
  $$Pu s(t) = \frac{Nu s(t)}{N_{s}(t)+N_{a}(t)}.$$
the percentage of employed graduates who completed their studies for the year in relation to a given period of time, $P_{v1}$:

$$P_{v1} = \frac{N_{us1}}{N_{a1}},$$

where $N_{us1}$ – the number of employed graduates who completed their studies in a year in relation to a given period of time; $N_{a1}$ – the number of graduates who completed their studies in a year in relation to a given period of time;

- the number of students who got a practice with the help of the module, $N_{usp}(t)$;

- the percentage of students who got a practice using the module, $P_{usp}(t)$:

$$P_{usp}(t) = \frac{N_{s3}(t)}{N_{s}(t)},$$

- the number of students applying for an internship using the module, $N_{uss}(t)$;

- percentage of students applying for a module internship, $P_{uss}(t)$:

$$P_{uss}(t) = \frac{N_{uss}(t)}{N_{ss}(t)}.$$
To evaluate the module effectiveness by functional parameters, the following sequence of actions is proposed:

1) The choice of analog and analysis of its functional parameters.
2) Compilation of a matrix of functional parameters of the new module and its analog.
## The Matrix Of Functional Parameters Of The New Module And Analog

<table>
<thead>
<tr>
<th>Functional parameter</th>
<th>Weight importance $a_i$</th>
<th>New module</th>
<th>Analog</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Numeric value $b_{in}$</td>
<td>Relevance $a_i b_{in}$</td>
</tr>
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<td>0.0256</td>
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<tr>
<td>1.2</td>
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<td>1.4</td>
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<td>1.5</td>
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<tr>
<td>4.5</td>
<td>0.0256</td>
<td>1</td>
<td>0.0256</td>
</tr>
<tr>
<td><strong>The sum of all parameters</strong></td>
<td><strong>$\sum_{i=1}^{N} a_i = 1$</strong></td>
<td>27</td>
<td>1</td>
</tr>
</tbody>
</table>
As an analog, the database (DB) of graduates, existing in the university before the introduction of the developed module, was selected. The analogue has the following key disadvantages: lack of access for employers to the database; primitive system of vacancies search. Thus, the analog performs the following functions:

- View of all current vacancies of students and graduates;
- Search for vacancies by company name;
- Search for vacancies by position;
- Providing administrator access to editing, deleting information in the application and resume;
- Filling in the application by the administrator on behalf of the employer;
- Removal of inactive vacancies by the administrator.

In the matrix of functional parameters of the new module and the analog (shown in slide 10), the listed analog functions are assigned the values “1”, the missing functions are respectively assigned the values “0”.

3) The calculation of the integral indicator of efficiency (Ki) of the new module "University + Employer" in comparison with the analog in accordance with formula (1) and the values of parameters given in the matrix of functional parameters of the new module and analog. According to the calculations Ki = 4.34. It confirms the feasibility of developing and introducing a new module, since its integrated quality indicator in terms of functional indicators is 4.34 times higher than the quality indicator of a previously existing database of university graduates.
METHODOLOGY FOR EVALUATING THE EFFECTIVENESS OF THE MODULE "UNIVERSITY + EMPLOYER" DURING OPERATION

In the process of the module operation, in addition to functional parameters, indicators characterizing the satisfaction degree of all module users: applicants (students and graduates), employers, and administrators come to the fore. Moreover, the relevance of specific indicators varies depending on users:

- for applicants, the percentage of satisfied applicants, $P_{us}(t)$, is most important;
- for employers - percentage of satisfied vacancies, $P_{uv}(t)$;
- for administrators representing centers for the promotion of employment and adaptation of university graduates, the most significant accreditation indicator of the university is the percentage of employment of graduates $P_{v1}$. This indicator is also included in a number of international university ratings, thereby influencing the reputation of the university in the international market.

The Matrix Form Of The Module Operating Parameters For The Current Reporting Period In Comparison With The Previous Period

<table>
<thead>
<tr>
<th>Operational efficiency parameters</th>
<th>Weight importance coefficient $a_i$</th>
<th>Reporting period</th>
<th>Previous period</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_{uv}(t)$</td>
<td></td>
<td>Numeric value $b_{i0}$</td>
<td>Relevance $a_i b_{i0}$</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td>Numeric value $b_{iP}$</td>
<td>Relevance $a_i b_{iP}$</td>
</tr>
<tr>
<td>Amount of all parameters</td>
<td>$\sum_{i=1}^{n} a_i = 1$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To calculate the effectiveness of operational indicators that change during operation, it is proposed to use the integral indicator $K_e$:

$$K_e = \frac{\sum_{i=1}^{n} a_i b_{i0}}{\sum_{i=1}^{n} a_i b_{ip}}$$  \hspace{1cm} (2)

where $n$ is the number of product parameters; $a_i$ - weight importance coefficient of the $i$-th parameter; $b_{i0}$, $b_{ip}$ - values of the $i$-th parameter characterizing the product quality, respectively, in the reporting period and in the previous period, estimated by experts in points.

The methodology for evaluating the module effectiveness by operational parameters implies the following actions:

1. Compilation of a matrix of operational module parameters for the current reporting period in comparison with the previous one (the matrix form is presented in slide 12).
2. Calculation of the integral indicator of module efficiency by operational indicators according to (2).

Obviously, the module efficiency during its operation is significantly affected by functional indicators, since for all types of users the priority will be given to a module that has obviously better functional indicators and is most convenient to use.

In this regard, to evaluate the full efficiency indicator of the module $K_\Sigma$, which is in operation, it is advisable to use the following expression:

$$K_\Sigma = K_i K_e$$
CONCLUSIONS

1. The systematization of efficiency indicators of the EIEE module «University + Employer» taking into account their division into target parameters that determine the functional purpose of the module and parameters that characterize efficiency at the operation stage is proposed.

2. The use of a matrix of functional parameters of a new module and an analog for their comparison by the target effect is proposed; matrix of operational module parameters for calculating the module effectiveness for the current reporting period in comparison with the previous one.

3. A methodology for evaluating the indicator of integral module efficiency of the EIEE “University + Employer», which takes into account all the target and operational parameters of the developed module has been developed. This methodology can be used both at the design stage of similar modules, and to calculate the efficiency indicators of the used modules, designed for interaction between universities, students and graduates, employers.

4. The integral efficiency indicator \( K_i \) of the new module «University + Employer» in comparison with the analog, which confirmed the feasibility of developing and introducing a new module, since its integral quality indicator by its functional indicators is more than 4 times higher than the efficiency indicator of the previous databases of graduates of PSU was calculated.
Thank you for attention!

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