

MODELLING THE INFLUENCE OF IT SUPPORT ON SUCCESS AT PUBLIC CALLS FOR PROJECT PROPOSALS

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Abstract: *Paper presents the study of factors affecting success at public calls for research and development project proposals on a sample of Slovenian small and micro, medium and large companies. First part of research involved gathering the data on company participation in public calls and quantitative analysis of data in order to identify the sample of companies most successful at public R&D calls. Second part of research utilized qualitative methods: interviews with companies in the sample, qualitative analysis of interviews, and formation of a grounded theory and a paradigmatic model, with the goal of identifying the role and impact of IT support and other factors that influence the success of companies in public tenders for co-financing of R&D projects. We have identified relevant IT support related factors and the additional factors of human resources. In the process we have developed a novel multicriteria model for evaluation of performance at public calls, which takes into account the funds acquired, the number of acquired projects, the ratio of public resources and funds from market activities, the number of employees. The results of our research are applicable in the theory of project management, sociological research on interplay of IT and society and have a potential impact in the design and management of public calls for project proposals and the approach to public calls for project proposals in companies.*

Keywords: *project management, EU funds, project proposals, public calls, success factors, IT support.*

1. INTRODUCTION

Public calls for research and development project proposals present an important source of co-financing for development, especially for small and micro enterprises. However, the same companies are held back from accessing the funds by fundamental problems - a lack of trained personnel capable of preparing and managing a complex project proposal [1] or insufficient spare time to prepare a proposal. Thus, some companies do not apply at calls demanding detailed project proposals, or the quality of their applications is poor. On the other hand, modern software solutions for project management facilitate planning and implementing projects, and reduce the amount of work. The baseline problem that our research aims to impact is the low administrative absorption capacity of companies in drawing EU funds from public tenders, i.e. low rate of success of companies at EU funded calls for project proposal [2] in [3].

On the side of applicants (i.e. companies), issues with methodology, skills and IT support of project management affect both the development of suitable project proposals and the management of co-financed projects. Mrak and Wostner argue that „the administrative burdens of applicant must be proportionate to the expected benefits” [4] in [3, p. 190], which means that the difficulty of the tender documentation and the application process should increase with the size of project funds, as they reflect project difficulty and complexity.

To improve understanding of these issues we have researched how companies in Slovenia carry out project planning in the role of applicants at EU funded public calls for proposals and identified the properties of information support and some other factors that influence the success of companies in such tenders through their practices and the use of sociological theories.

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2. METHODOLOGY

Our research was divided into two parts:

- quantitative research on the database of companies and their co-financing from EU funded calls, with the goal of identifying companies successful at public R&D calls, and
- qualitative research, with the goal of identifying factors influencing success at calls, with focus on IT support.

2.1. Quantitative research

First part of research involved gathering the data on project proposals with lead Slovenian company partners selected in European and national (Slovenia) public calls from the beginning of the previous EU financing perspective in 2007. Quantitative analysis of data was done to analyze the participation of companies at public calls and select a sample of companies most successful at public R&D calls for qualitative research.

The data contained 1254 selected successful project proposals by 704 different companies funded from 31 different public calls for proposals dating from 2007 to 2016. As most of the work on proposal development and managing projects preparation and project management work is performed by leading project partners, we have selected only EU projects where a privately-owned company registered in Slovenia was the lead partner. Population was then divided into three groups: small and micro; medium-sized; and large companies according to the EU guidelines [5] in order to compare only companies with similar human and financial resources, avoid the domination of large companies in the sample and make sure the sample also contained representative small, micro and medium companies, which are the backbone of Europe's economy, representing 99% of all businesses in the EU [6]. Data was then grouped by company to generate our final version of the database, that included a list of:

companies name, address, VAT number,

- ownership structure,
- total number of successful projects proposals,
- total amount of financing acquired at public calls,
- average sales revenue over the last 2 years, and
- number of employees.

Our main method in sample selection was a novel multicriteria model for identification of public R&D tender applicants' success, which takes into account the total funds acquired, the number of financed projects, the ratio of public resources and funds from market activities, the number of employees, and allows us to identify successful applicants. The multicriteria model was developed using an influence diagram [7] to describe the structure of criteria (Figure 1) and the AHP method [8], [9] to determine the weights of the criteria. The model was implemented in the form of a formula (1) in the spreadsheet used to evaluate and rank the companies.

The novel multicriteria model for company ranking is represented here as utility function $F(k)$.

$$F(k) = K_{ss} * W_{ss} + K_{OZ} * W_{OZ} + K_{RD} * W_{RD} \quad (1)$$

The elements of Equation (1) are:

- K(x)- criterion (all normalized to preferential scale 0..100 using the analyzed sample),
- W(x)- criterion weight (determined by the AHP method),

Criteria:

- K_{SS} – cumulative co-financing per company - the most important criterion, 60% of total weight,
- K_{OZ} – no. of projects per employee - second most important criterion (1/2 importance of the most important criterion), 30% of total weight,
! exact number of employees was not available for all companies, and we used the approximation given by national business registry (9 or 49 for micro and small companies, 249 for mid-sized companies, 249 or 500 for large companies)
- K_{RD} – ratio between co-financing from public tenders and sales revenue - the least important criterion (1/6 of the importance of the most important criterion), 10% of total weight.

The data was ranked separately by small and micro companies, medium companies, and large companies. Four best rated companies from each category were selected as the sample for qualitative research, i.e. semi-structured interviews.

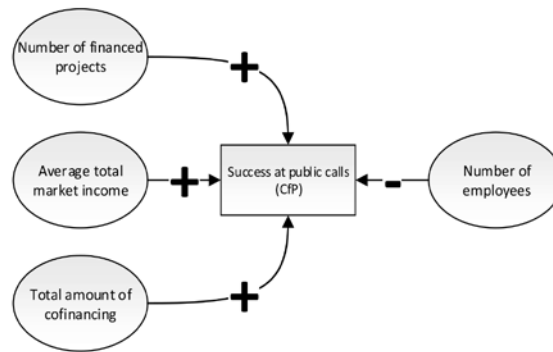


Figure 1: Influence diagram for success at public calls

2.2. Qualitative research

Second part of research utilized qualitative methods: semi-structured interviews [10] with companies in the sample (four best rated companies from each size category), qualitative analysis of interviews, and formation of a grounded theory and a paradigmatic model [11], with the goal of identifying the role and impact of IT support and other factors that influence the success of companies in public tenders for co-financing of R&D projects.

The content of interviews was focused on how companies in the role of the applicant implement project generation, selection, planning and preparation of project proposals for public calls, the IT support (types of software) and IT training provided by the company for this purpose, and the attitude of employees towards software provided.

The process of qualitative analysis of the interview transcripts was divided into six steps: (1) arranging the material, (2) determining the coding units, (3) open coding, (4) selecting and defining the relevant concepts and categories, (5) relational coding and (6) forming the final theoretical formulation (for more information on methodology see [12]: p. 75).

The main goal of the qualitative content analysis was the creation of concepts, hypotheses and explanations, that is, the grounded theoretical formulation, which is read as a narrative about the use of project management software and its impact on the performance of companies. We

formed the grounded theory via „selectively encoding” [13] the categories formed in the process of qualitative content analysis by linking them to each other and displaying the relations between them within the paradigmatic model scheme. The selective coding was carried out with reference to the research questions.

3. RESULTS

3.1. Quantitative research

The scores of companies obtained with the multicriteria model () were calculated on a scale , where the value of 100 represents the best possible score. The following figures present an overview of the results. All figures show the company score ($F(k)$) relative to company rank. Rank (x axis) is shown with logarithmic scale to display the differences between top ranking companies more clearly. Only the first 100 companies are shown (417 small and micro companies, 106 mid-sized, and 76 large companies were in the sample).

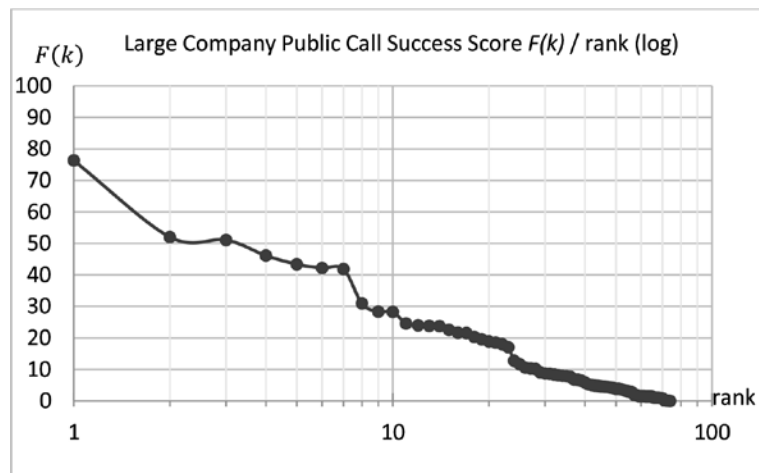


Figure 2: Large Company Public Call Success Score

In Figure 2 we can observe that the most successful company is an outlier (score=76.32, 24.3 more points than the next best), followed by a group of six companies with score between 52.05 and 41.88, while most of the companies trail behind in an almost linear sequence with scores under 30 (>11.88 lower than the best performing group). There seem to be at least two groups of companies evident in the figure (plus the outlier), and we can assume that the best performing groups are doing something differently than most companies and are therefore of interest for our qualitative research.

A very similar relationship of score and rank is shown for middle sized companies in Figure 3, with one outlier with score of 78.23 and two companies with score 61.56 (16,67 less than the best mid-sized company) and 61.04 outperforming the others (score 43.47 or less, more than 17,57 points below the best group) at public calls.

Rather different results for best performing companies are shown for the group of small and micro companies in Figure 4. The best performing small or micro company has only 57.28 points, 20.95 points less than the best performing mid-sized company and 19,04 points less than the best performing large company. It is apparent that there are significant differences between best performing small and micro

companies and best performing medium and large companies. However, more small and micro companies seem to be obtaining public call funds, as the small or micro company ranked 100 on the list scored 7.56 points, compared to 0.55 for the 100th mid-sized company and 0.01 points for the last, 76th large company.

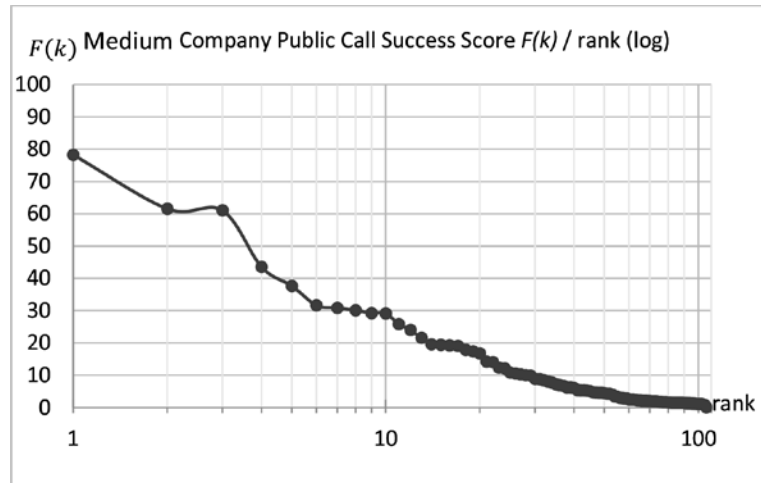


Figure 3: Medium Company Public Call Success Score

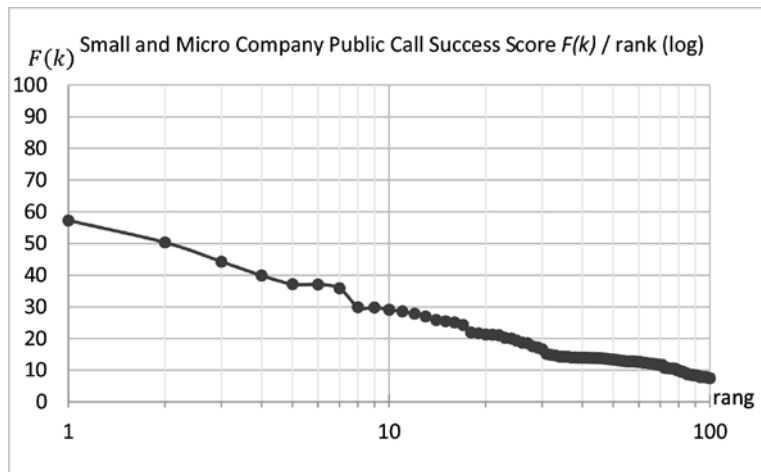


Figure 4: Small and Micro Company Public Call Success Score

To supplement the comparison, in examined time period (2007-2016) the best performing large company has obtained a total of ~9M€ funding (~10% of average annual revenue) for 7 projects, best mid-sized company ~6M€ (~50% of average annual revenue) for 12 projects, and best performing small or micro company ~6M€ (~10% of average annual revenue) for 9 projects (~60% of average annual revenue).

3.2. Qualitative research

The results of qualitative research contained in the paradigmatic model show that the impact of information support on the project organization of work in companies in successful participation in national and community calls can depend on:

- the degree of structure in work organization,
- the qualifications of employees in terms of exploiting the opportunities offered by the specialized project management software,

- employee attitude towards specialized software and, last but not least, the way of using the software. Companies indirectly influence the attitude of employees towards the software and its effective use through their software training methods.

We found that in all interviewed companies, regardless of size:

- they use separate software for administrative management and cost management,
- size, number of projects influences the need for software,
- they evaluate the ISARR system (national project reporting) negatively,
- prefer electronic (web based) call applications and project reporting,
- are motivated to use project management software.

Regardless of the size of the company, users are mostly in favor of using software for proposal work, and software is considered indispensable when preparing a project proposal. Specialized (purchased or custom made) software is seen as reliable while adapted general purpose software (mostly Open/Libre Office or Microsoft Office) is seen as unreliable. We find that in large companies the attitude of employees towards software is influenced by regular updates and user-friendly interface.

4. CONCLUSION

By comparing the practices of the most successful small and micro, medium and large companies, we have identified the additional (to IT support) relevant factor of human resources.

Via additional interviews with intermediary (financing) body representatives we have identified the mismatch of project impact estimation between the recipients of funding (companies) and financing control.

To aid in sample selection we developed a novel multicriteria model for identification of public R&D tender applicants' success, which takes into account the funds acquired, the number of acquired projects, the ratio of public resources and funds from market activities, the number of employees, and allows us to identify successful applicants. The model allowed us to select a relevant sample of successful companies and can be used to determine the public call financing potential of a company.

The results are useful both in the practice of planning public tenders and in preparing project proposals for applying for public tenders and project management. They also serve as an identifier of problems in systemic planning and tendering on the side of the managing authority and the intermediate body.

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