

Association for Information Systems AIS Electronic Library (AISeL)

AMCIS 2004 Proceedings

Americas Conference on Information Systems
(AMCIS)

December 2004

Success Factors in ERP Systems Implementations. Result of Research on the Polish ERP Market

Piotr Soja

Cracow University of Economics

Follow this and additional works at: <http://aisel.aisnet.org/amcis2004>

Recommended Citation

Soja, Piotr, "Success Factors in ERP Systems Implementations. Result of Research on the Polish ERP Market" (2004). *AMCIS 2004 Proceedings*. 492.

<http://aisel.aisnet.org/amcis2004/492>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2004 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Success Factors in ERP Systems Implementations. Result of Research on the Polish ERP Market

Piotr Soja

Cracow University of Economics, Kraków, Poland
eisoja@cyf-kr.edu.pl

ABSTRACT

In the article the problem of success factors in ERP systems implementations has been discussed. The review of the literature concerning success factors has been discussed and a collection of potential ERP implementation success factors was identified. Next, the result of research has been presented where respondents have been asked about their opinion about the importance of subsequent factors for the implementation success and about the factors' appearance in researched implementation projects. There were two groups of respondents: the first consisted of people from Polish enterprises implementing ERP systems and the second comprised experts working in ERP systems suppliers. The synthetic measure of implementation success was constructed and the analysis of the factors' impact on the implementation project success was performed. Then, on the basis of this analysis, the most influential factors for the ERP implementation success were selected.

Keywords

ERP systems, implementation, success factors

INTRODUCTION

The most advanced group of integrated systems are the ERP class systems that include mechanisms based on planning and forecasting, which support the management of the entire enterprise and integrate all of its activity. The effective implementation of such a system can bring about many benefits, beginning with the most general, such as enterprise management and information flow enhancement. Consequently, improvement of economic indicators is achievable, which finally leads to an increase in enterprise profitability.

However, the achievement of these above-mentioned benefits depends upon the effective implementation of the full functionality of the ERP system, which is quite difficult. There are a great many implementation projects that do not bring about the planned effects, or even end up in project abandonment. The duration and budget of the implementation projects significantly exceed initial estimates, and the planned scope of the implementation is limited.

Therefore, conducting research seems crucial in order to reveal the mechanisms determining the success of implementation projects. There is a need to perform analysis for the purpose of identifying potential ERP implementation success factors, then to verify the findings with the help of real implementation project participants. During the next stage of research, the group of factors that most influence the implementation success should be formulated.

THE IDENTIFICATION OF ERP IMPLEMENTATION SUCCESS FACTORS

Overview of the research on ERP implementation success factors

ERP system implementation is a process of great complexity, with a great many conditions and factors potentially influencing the implementation. These conditions could have a positive effect on the outcome of ERP project, while their absence could generate problems during implementation. The results of some research on ERP implementation success factors have been described below (see also Soja 2004).

Burns, Turnipseed and Riggs (1991), researching critical success factors in MRP implementation, suggested dividing potential factors into environmental and methodological. Environmental factors include, apart from those describing enterprise activity, the product technology level and the organisation's willingness to change. The methodological factors are connected with the implementation approach incorporated. On the basis of 504 survey responses, most of the methodological factors were identified as being associated with MRP II success, while only two of the environmental factors were found to be connected with implementation success—product technology and organisation willingness to change.

In other research, Parr, Shanks and Darke (1999) turned to experts participating in many implementation projects. The research sample consisted of 10 experts who had participated in a total of 42 ERP implementation projects, mainly as project managers. Based on interviews with the experts, 10 candidate factors necessary for successful implementation of ERP systems are identified. These factors were divided into groups related with management, personnel, software and project. Of these 10 candidate factors, three are of paramount importance. They are management support of the project team and of the implementation process, a project team that has the appropriate balance of business and technical skills, and commitment to change by all the stakeholders.

Holland, Light and Gibson (1999) presented a number of potential success factors in ERP implementation and suggested their division into strategic and tactical factors. The model was only illustrated on a sample of 5 implementation projects. Furthermore, the authors did not formulate conclusions regarding factors' importance and their ranking.

Esteves and Pastor (2000) suggested a unified ERP implementation critical success factors model. This model is based on the analysis of considerable research regarding implementation success factors. The authors indicated that factors should be categorised into strategic and tactical factors from organisational and technological perspectives.

The general model of ERP implementation success factors

The results of above-mentioned research on ERP implementation success factors illustrate the problem complexity and the variety of approaches. Potential success factors and the results of research differ substantially from each other. Except for general agreement regarding the necessity of management support for implementation, it is rather difficult to compare the outcomes achieved by the research. This difficulty is deepened by the difference in research samples, which ranged from hundreds of manufacturing enterprises, through a group of experts, up to a set of only 5 implementation cases.

Taking into account the results of the research mentioned, literature studies (among others Parr et al. 1999; Skok and Legge 2001; Stewart et al. 2000) and experience in the business environment, a general model of ERP implementation success factors has been proposed (see also Soja 2004). Success factors, presented in Table 1, are divided into the groups regarding their broader aspect. The separated groups consist of factors related to implementation participants, top management involvement, project definition and organisation, project status and information systems.

RESEARCH SAMPLE CHARACTERISTICS

The research of ERP system implementation projects was twofold: firstly from the viewpoint of enterprises that had decided on an ERP system implementation, and secondly from the perspective of ERP systems and services suppliers. Both groups of respondents represent two parties involved in an implementation project and it is valuable to know their beliefs regarding ERP success factors. In the first case, the research sample consisted of Polish enterprises implementing an ERP system in their organisations. In the second case, the research sample comprised the consultants and experts representing various suppliers of ERP systems. The research was carried out for the years 2001 and 2002.

The research done on enterprises implementing the ERP system into their organisations was conducted with the use of a questionnaire, which was directed toward the people playing leading roles in the implementation (the project leader, if possible). During the research, 223 enterprises were contacted and 68 (30%) answers were obtained from enterprises representing the whole country and various industries.

In order to examine the experts' opinions, the research questionnaire was directed to specialists with experience in implementing various ERP systems—those who were leading implementation projects from the supplier perspective and taking part in many implementations. Therefore, they provide a broader view of the projects' conditions and their opinions, representing another party of project participants, could be compared with the viewpoint of people from within the companies introducing an ERP system. During the research, 45 people were questioned and in the end 31 (69%) experts' opinions were gathered. The experts represented 22 firms supplying ERP systems and implementation services.

Factor	Factor description
Related to the implementation participants	
A project manager	The project manager is the person from the enterprise who sacrifices most of his working time to implementation duties
B team composition	The implementation team consists of various people having high qualifications and knowledge about the enterprise
C team involvement	The project manager and members of the implementation team are strongly involved in the implementation duties
D motivation system	There is a motivation system rewarding participation in implementation and on-time task delivery
E co-operation with supplier	Good co-operation with the system supplier who is competent and offers high level of services
Related to the top management involvement	
F top management support	The top management support for the project and the management members involvement in implementation duties
G top management awareness	Top management awareness regarding the project goals and complexity, labour required, existing limitations, required capital investment and project inevitability
H top management participation	Top management participation in the project schedule and goals definition
Related to the project definition and organisation	
I linking with strategy	Linking the implementation project with enterprise strategy (implementation as a method of achieving the enterprise's strategic goals)
J implementation goals	The definition of implementation goals – defined in economic terms at the enterprise-wide level
K detailed schedule	The definition of detailed implementation scope, plan and schedule with responsibility allocation
L pre-implementation analysis	The enterprise analysis and diagnosis prior to the start of implementation, and the creation of the enterprise functioning model with the integrated system support
M organisational change	The change in the enterprise organisation and its business processes
N monitoring and feedback	The implementation monitoring and feedback – information exchange between the project team and end users
O implementation promotion	The implementation promotion – the information broadcasting about the project by the implementation team members to other enterprise employees
P fast effects	The visible fast partial positive results of the implementation
Q appropriate training	The adequate training program suitable to the enterprise's needs
Related to the project status	
R investment plan	The formal introduction of the implementation project in the enterprise investment plan
S project team empowerment	The empowerment of the project team members to make decisions and their high position in the enterprise hierarchy
T financial budget	The financial resources assured during the implementation
U work time schedule	The work time assured for the implementation team members (work time schedule)
V IT infrastructure	The appropriate IT infrastructure assured for the implementation project
Related to information systems	
W system reliability	The ERP system reliability, its user friendliness and fit to the enterprise's needs
X minimal customisation	Minimal system customisation – the use of defined patterns and solutions embedded in the system
Y legacy systems	The legacy systems adaptation for the operation in the ERP integrated system environment
Z implementation experience	The project team members' experience gained during former information systems implementation

Table 1. The general model of ERP implementation success factors

The arrangement of data from enterprises

The analysis of data from respondents from enterprises was performed from three perspectives. Among the criteria defining division into perspectives are enterprise size, implementation scope and implementation duration.

The criterion defining enterprise size was the number of employees. For the needs of analysis, enterprises have been divided into small and large companies. The small firms comprised enterprises employing less than 300 people (29 companies); the remaining companies formed the group of large enterprises (39 companies).

The division regarding implementation scope was made by taking into consideration the modules implemented of the ERP system. The following modules were taken into consideration: Finance, Purchasing, Inventory, Sales, Shop Floor Control and MRP Explosion. Full-scope implementations were defined as the projects where the modules Shop Floor Control and MRP Explosion were implemented and also satisfying the condition that at least 4 modules were introduced. Given such a definition, the group of full-scope implementations comprised 31 projects, while the rest of the projects (37) created the group of partial implementations.

In the division taking into account project duration, short implementations were defined as projects lasting up to one year, and those lasting more than one year were marked as long implementations. The group of short implementations comprised 33 enterprises; similarly 33 projects were recognised as long implementations. In the case of 2 implementations, the projects were not finished when the research was conducted.

FACTOR'S IMPORTANCE AND OCCURENCE LEVEL

The respondents from enterprises expressed their opinions about the importance of the factors listed in the implementation process. They used a scale from 0 to 5, where 0 stood for no importance at all and 5 meant the highest importance. In the next step, they estimated the level of occurrence of each factor (on a scale from 0 to 5) in their ERP projects. Similarly to respondents from enterprises, the experts expressed their opinions regarding the importance of the factors suggested in the implementation process. Additionally, they were asked to mark the factors whose occurrences, in their opinion, are necessary for a successful implementation.

Considering responses from all queried enterprises, the respondents on average recognised factor B (with an average of 4.6) as the most important element. The following positions were taken by factors: E, G, W, C, V and K. On average, the least important factors respondents considered Y (with an average of 3.17), P, X, O and H. Respondents were unanimous in their judgement of the factors' importance for the project outcome, regardless of established division into groups. More detailed discussion of factors importance is present in (Soja 2004).

The highest level of occurrence, in the opinion of all researched enterprises, achieved factor B (with an average of 4.1). The following positions were taken by factors: V, A, R, C, T and K. The factors, which on average reached the lowest levels of occurrence, are in ascending order: Y (with an average of 2.13), D, M, H and X. The respondents, regardless of established division into groups, were unanimous as regards the factors' ranking on the basis of their level of occurrence.

The experts, on average, considered factor F (with an average of 4.65) as the most important element for the project. The following positions were taken by factors: A, T, B, K, S and U. As the least important factors for the implementation projects, the experts considered X (with an average of 2.04), Y, D, M and H. Experts were unanimous as regards the factors' ranking on the basis of their importance. As regards the necessity of a factor's occurrence, most experts regarded factor A (23 answers) as the most necessary. The further positions were occupied by factors: K, B, T, F, S and C. It is worth noting that none of the experts recognised factor X as a necessary element in the project and that factors P and Y received only one positive answer.

The respondents from enterprises quite agree with experts as regards factor importance. In particular, both groups indicate factors B, C and K as the most important and necessary elements for project success. Additionally, experts suggest factors A, T, F and S to be of paramount importance. These factors, however, are somewhat underestimated by respondents from enterprises. The latter, on the other hand, indicate the importance of factors E, G and W. These factors, in turn, are underrated by experts, which is exceptionally evident in case of factor W.

FACTOR'S INFLUENCE ON IMPLEMENTATION OUTCOME

The understanding of a successful implementation is the crucial point in the ERP implementation success factors issue. In the research presented, only Burns et al. defined success, addressing the subjective assessment of implementer's intentions and achieved implementation level on the basis of the ABCD method. In other research, implementation success was not clearly defined or was treated as satisfying the planned time and budget. The proposed model suggests the definition of a successful implementation on the basis of the success understanding in the information systems domain. Implementation success is perceived as the completion of assumed goals and implementation scope within a planned time and budget, while achieving user satisfaction.

In order to prove the influence of the factors identified on implementation outcome, a synthetic measure of implementation success was worked out based on five partial measures, which were researched by a questionnaire. The measures include:

- the actual scope of an implementation with respect to the planned implementation
- the actual duration with respect to the assumed duration
- financial budget with regard to the planned budget
- users' level of satisfaction from the system introduced
- the existence and achievement of project goals

The information regarding partial measures was collected from people playing leading roles in implementations—project managers in most cases. They had insight into their projects and were able to assess above-mentioned measures. However, it would be of value to obtain opinions from a broader range of project participants. It is especially valid for the measure “users' level of satisfaction,” where, in the ideal situation, the evaluations should be obtained from the actual users of the system.

After the calculation of implementation success measure, for each success factor, the correlation coefficients between the level of factor occurrence and the success measure were calculated for researched projects. This computation was performed in order to determine the impact of a factor's occurrence on the successfulness of an implementation project.

Taking into account all researched enterprises, the influence of a factor's occurrence on project success is not great, because the highest correlation value is equal to 0.42. Factors with the greatest influence on implementation success are: C, W, B, K, V and F.

Within the group of small enterprises, factor Z definitely has the strongest influence on implementation successfulness (with correlation at level 0.6). The influence of the remaining factors is significantly weaker—correlation coefficients are below 0.4. Factors with the greatest influence on project success are: R, C, B and N. Within the group of large enterprises, factors K (correlation 0.68) and G (0.62) clearly have the strongest influence. The remaining factors with the highest influence are: F, W and J. It is worth noting, that factor Z, which has the largest influence on project success among small enterprises, in the case of large enterprises is placed on the last position, having a small negative influence on implementation success.

For full-scope implementation projects, four factors have a clear, strong influence on project success, with correlations from 0.53 to 0.47. These factors are: W, S, B and I. In the case of partial implementation scope, six factors have the greatest influence on implementation success. This influence has a correlation from 0.58 to 0.49. These factors are: T, F, R, K, V and C. The interesting fact is that the most important factor among the projects with restricted scope, i.e. assuring the financial resources needed during the implementation, does not have any influence on full-scope implementation projects. Worth noting is also the fact that there are as many as three factors connected with implementation project status in the group of most influential factors.

For short projects, factor I has the greatest influence (0.54) on project success. The other most important factors are: E, C, W and Z. For long projects, factor V has a strong influence, which reaches the level of 0.68. Factor K also has a strong influence (level 0.57). Next, factors J, W, B and U have great influence (from 0.49 to 0.43) on project success.

Factors with greatest influence on implementation success

The factors' ranking regarding the opinions of experts and enterprise representatives is presented in Table 2. In the table there are ranks reached by subsequent factors given various criteria. The first two columns contain factors' ranks regarding influence on implementation success. The first column relates to all enterprises researched, while the second contains the ranking, which was defined by adding ranks achieved by the factors in the division into the groups (i.e. using criteria: enterprise size, implementation scope and duration).

In general, taking into account the above-mentioned sum of ranks, the following factors have the strongest influence on implementation success (in descending order of influence):

1. *system reliability* (W) – plays the most important role among full scope projects and has a strong influence on implementation success in the case of large enterprises. This factor received very good notes from the respondents from enterprises as regards its importance for the implementation project, but is completely underestimated by experts regarding its importance, as well as occurrence necessity for project prosperity.

2. *team involvement* (C) – plays very important role in the case of projects in smaller enterprises and with shorter duration time. The experts recognise this to a certain extent, but they do not perceive it as the most important and necessary factor for implementation success.
3. *team composition* (B) – plays a very important role in the case of projects in smaller enterprises and with full ERP scope being implemented. There is a high agreement between enterprise representatives and experts in the assessment of this factor—the first recognize it as the most important factor for implementation prosperity, and the second regard it as one of the most important and necessary factors for implementation success.

Factor	Rank as regards correlation with success measure (all enterprises)	Rank as regards the sum of ranks in project groups divided according to firm size, implementation scope and duration	Rank according to necessity (experts)	Rank according to importance (experts)	Rank according to importance (enterprises)	Rank according to level of occurrence (enterprises)
A project manager	23	22	1	2	12	3
B team composition	3	3	3	4	1	1
C team involvement	1	2	7	8	5	5
D motivation system	15	15	20	24	21	25
E co-operation with supplier	7	5	9	11	2	11
F top management support	6	7	5	1	8	9
G top management awareness	8	10	10	10	3	13
H top management participation	17	19	17	22	22	23
I linking with strategy	13	8	13	13	17	14
J implementation goals	14	11	16	14	19	18
K detailed schedule	4	6	2	5	7	7
L pre-implementation analysis	21	24	12	12	15	20
M organisation change	18	17	23	23	20	24
N monitoring and feedback	16	16	14	15	11	8
O implementation promotion	24	23	22	21	23	21
P fast effects	19	18	24	20	25	19
Q appropriate training	20	21	21	17	16	16
R investment plan	9	12	15	18	14	4
S project team empowerment	12	13	6	6	9	12
T financial budget	10	14	4	3	10	6
U work time schedule	11	4	8	7	13	15
V IT infrastructure	5	9	11	9	6	2
W system reliability	2	1	18	16	4	10
X minimal customisation	26	25	26	26	24	22
Y legacy systems	25	26	25	25	26	26
Z implementation experience	22	20	19	19	18	17

Table 2. Success factors ranking

4. *work time schedule* (U) – highly regarded in all divisions of the projects group. Its influence does not depend on project duration; it has strong influence on implementation outcome in small enterprises. The experts regard it as an important and necessary factor for implementation success; however, enterprise representatives do not appreciate it.

5. *co-operation with supplier* (E) – plays a very important role in the case of projects with short duration, has essential significance for full scope implementations and for those taking place in large enterprises. This factor is underestimated by experts; however, enterprise representatives regard it as an important factor.
6. *detailed schedule* (K) – plays the most important role in case of large enterprises and is very important for long-term projects. This factor is also important for partial scope projects. Enterprise representatives and experts regard it as an important element for project success. What's more, the experts recognize it as one of the most necessary factors for implementation project success.
7. *top management support* (F) – plays a very important role in the case of partial scope implementations and also in the case of large enterprises. This factor has strong influence on implementation success for long-term projects. The experts recognize this factor as the most important for implementation project success.

There are some factors whose influence on project success is apparent in certain situations, while, in general ranking, they are not highly positioned or even do not have any influence on project prosperity. These factors are:

1. *linking with strategy* (I) – has the greatest influence on short implementations; is also of great importance for full ERP scope projects.
2. *IT infrastructure* (V) – has the greatest influence on long projects; is also important for partial scope projects.
3. *financial budget* (T) – is of greatest significance for partial scope projects; has also big influence on implementation projects in large enterprises.
4. *implementation experience* (Z) – has the greatest influence on projects in small enterprises; has also big influence on short projects. For other types of projects, this factor practically does not have any influence on project success.

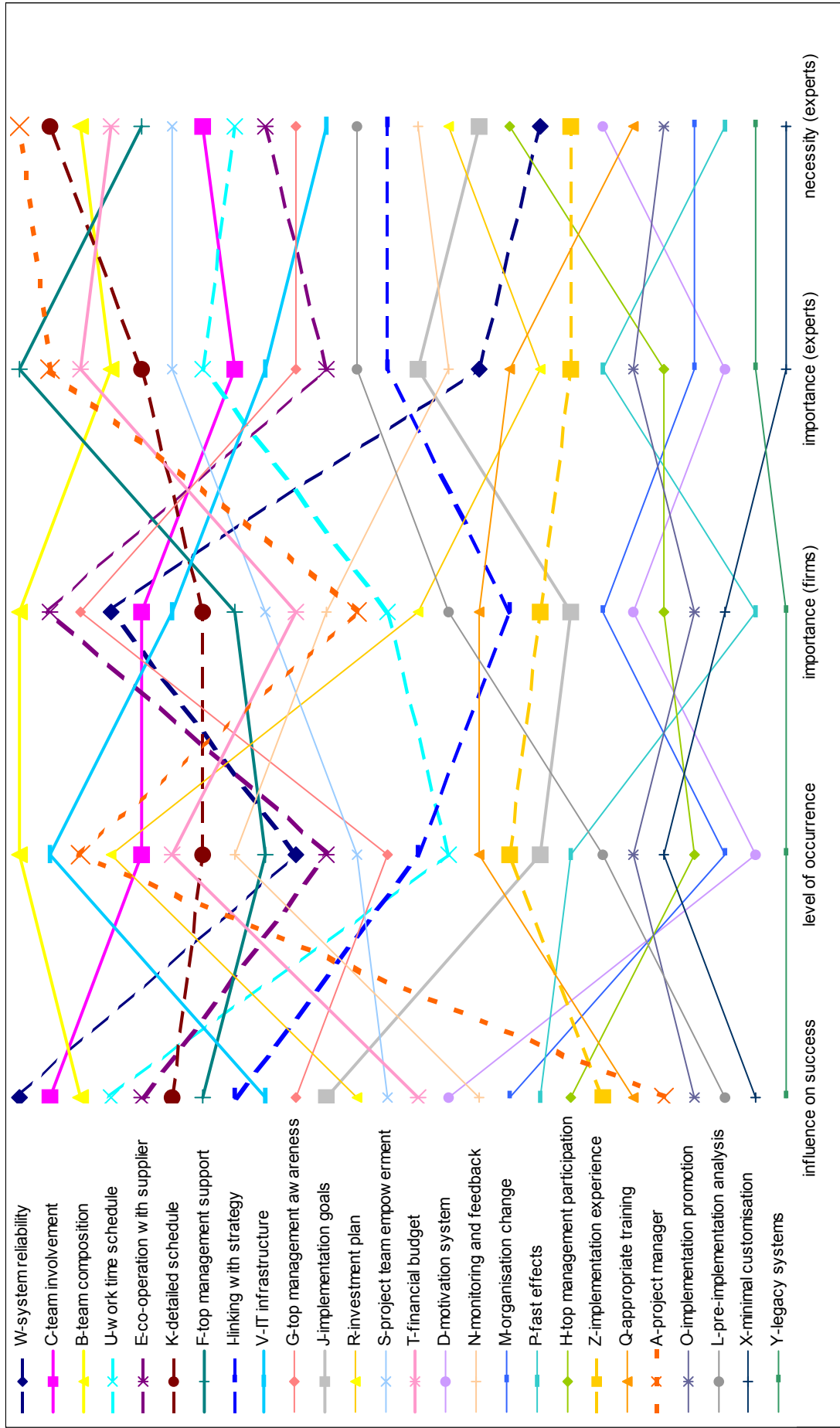
Factors that do not have influence on implementation success are:

1. *legacy systems* (Y) – this factor does not have any influence on project success; it is also regarded as completely unimportant and unnecessary for implementation success by both experts and enterprise representatives.
2. *minimal customisation* (X) – like factor Y, it does not have influence on project success and is perceived as unimportant and unnecessary for project success.
3. *implementation promotion* (O) – certain influence of this factor on project success has been noticed in case of full ERP scope projects; it does not have influence on implementation outcome for remaining types of projects. Experts and enterprise representatives also regard this factor as unimportant and unnecessary for implementation success.
4. *pre-implementation analysis* (L) – does not have influence on implementation success, but experts regard it as quite necessary and important for project prosperity.
5. *project manager* (A) – this factor does not have influence on implementation success; however, the experts regard it as the most necessary and one of the most important factors for project prosperity. The respondents from the enterprises also noticed a very high level of its occurrence in their implementation projects.

CONCLUSIONS

Picture 1 below contains the identified success factors arranged according to: the factors' influence on the implementation successfulness (column *influence on success*), the enterprise representatives' opinions in regards to the level of these factors' occurrence in their implementations (column *level of occurrence*), the factors' importance (column *importance (firms)*), the experts' opinions with respect to the factors' importance (column *importance (experts)*) and the necessity of these factors occurrence for the implementation prosperity (column *necessity (experts)*). Below, the main conclusions from the research conducted are listed.

- A. The factors that have the greatest influence on implementation success, regardless of the project type, are: *system reliability, team involvement, team composition, work time schedule, co-operation with supplier, detailed schedule and top management support*;
- B. The factors' influence on the implementation success should be examined taking into account the division of the projects into groups regarding the project duration, the scope being implemented and the size of an enterprise. The leading roles of certain factors appear in divided groups;



Picture 1. The ranking of ERP implementation success factors on the basis of research

- C. In small enterprises *implementation experience* has the greatest influence on the project success, while it does not have any significance in the case of large enterprises where *detailed schedule* is the most deciding factor. In the projects with the system's full functionality being implemented, *system reliability* has the largest influence, whereas in the case of partial functionality, *financial budget* plays the leading role. In long lasting projects, *IT infrastructure* has the largest influence, while in short projects, *linking with strategy* has;
- D. The implementation projects' participants do not appreciate the significance of particular factors which have an important influence on project success. The factors which are underestimated by experts are *system reliability* and *co-operation with supplier*, while the respondents from the enterprises underestimate *work time schedule*. All respondents underrate *implementation experience* and *linking with strategy*;
- E. The factor *project manager*, which is considered to be one of the most important factors by the experts and reached a very high level of occurrence in researched projects, does not have any influence on the implementation success;
- F. The wider the implementation project (i.e. the longer its duration and the larger the enterprise), the greater influence on the project success has *the definition of detailed schedule* and *setting the implementation goals*. In the case of vast projects, one has to pay special attention to the reliability of the system introduced.

SUMMARY

The research results presented should be useful for the professionals who are leading implementation projects and those making decisions for the first time on ERP system implementation in a particular enterprise. The research proved the influence of particular factors on the ERP projects success in certain circumstances. The implementers may make use of this knowledge while managing the implementation project. The research revealed also some differences in perceptions and attitudes between parties involved in an implementation project. The awareness of these attitudes could be useful for practitioners in order to manage the change of negative stances and make use of the positive ones. Nevertheless, the author hopes that the conclusions drawn in this paper will be at least an inspiration for project enhancement.

REFERENCES

1. Burns, O. M., Turnipseed, D., Riggs, W. E. (1991) Critical Success Factors in Manufacturing Resource Planning Implementation, *International Journal of Operations & Production Management*, Vol.11, No.4, MCB University Press. 5-19.
2. Esteves, J., Pastor, J. (2000) Towards the Unification of Critical Success Factors for ERP Implementations, In *10th Annual BIT conference*. Manchester, UK.
3. Holland, C., Light, B., Gibson, N. (1999) A Critical Success Factors Model for Enterprise Resource Planning Implementation, In *7th European Conference on Information Systems ECIS*, Copenhagen, Denmark.
4. Parr, A., Shanks, G., Darke, P. (1999) Identification of Necessary Factors for Successful Implementation of ERP Systems, *New Information Technologies In Organizational Processes – Field Studies And Theoretical Reflections On The Future Of Work*, Kluwer Academic Publishers, 99-119.
5. Skok, W., Legge, M. (2001) Evaluating Enterprise Resource Planning (ERP) Systems using an Interpretative Approach, In *ACM SIGCPR 2001 Conference on "The IT Personnel Crisis: Finding and Retaining the Skilled Workforce"*, San Diego, USA.
6. Soja, P. (2004) Important Factors in ERP Systems Implementations: Result of the research in Polish enterprises, In *Proceedings of the Sixth International Conference on Enterprise Information Systems ICEIS 2004*, Vol.1, Porto, Portugal, 84-90.
7. Stewart, G., Milford, M., Jewels, T., Hunter, T., Hunter, B. (2000) Organisational Readiness for ERP Implementation, In *Americas Conference on Information Systems AMCIS*.