

Successful Control of Innovative Projects: An Empirical Study

Joern Littkemann, Institute for Business Administration, University of Muenster

Abstract

This empirical study shows how German industrial companies apply methods of project management and project control in product innovation processes. Moreover, the study considers which factors have a significant influence on the project success. In this context, a special account for innovative projects is an instrument to integrate the activities of the innovation process. The significance of achieving economic effectiveness during the innovation process is a suitable measure to indicate the 'overall project success'. It is, therefore, necessary in management accounting to treat an innovation project as an investment. The organized co-operation between project management and management accounting is a relevant key factor to increase the project success.

Keywords: Accounting for Innovation, Empirical Results, Innovation Success, Integration Instruments, Project Control, SMC

Introduction

The literature on project management is extensive and varying (Hauschildt 1997). In this context, the analyzes mainly focus on technological aspects. Economic aspects, however, seem to play a role of minor importance. This is due to the fact that the use of project management techniques and instruments has a great importance in practice but it is rather neglected in the theoretical field of business administration. There exist only a few empirical studies to deliver solutions for successful controlling projects. Furthermore, the interdisciplinary character of project management is very often not considered sufficiently in literature. Especially the lack of communication between the disciplines of organization and accounting is deplorable (Littkemann 1996). Hence, this empirical study introduces strategies for project management and project control that lead to successful completion of innovative projects (see Schewe 1994).

Sample

Two questionnaires were sent to 103 companies which had applied for the German innovation price with a new product or process development (Littkemann 1997). One questionnaire was addressed to the responsible project leader and comprised questions concerning the internal project organization of the respective innovation. The other questionnaire was addressed to the leader of the accounting department and contained questions about the applied techniques of project control coordinating the activities of the innovation process. 39 firms sent both questionnaires back. Consequently, the rate of return nearly reaches 40 per cent. The sample mainly consists out of small and middle sized companies (mean = 70 employees). Without exception, the analyzed innovation projects are new product developments that are determined to be sold onto the market. On average, the innovation costs amount for 20 per cent of the annual

sales. The period of the formal project time covers three years on average, i.e. only the half of the total innovation process duration.

Variants of Project Management

Project planning and project control

Tab. 1 shows which departments of the 39 analyzed firms are involved in project planning and control. The most noticeable observation is that the top management very often participates in project management. Obviously, innovation is a chief-task of major importance. Like the top management, the project leader is highly involved in the planning and control process. Thus, the project leader is the project team's driving person who is responsible for the operative project tasks. The top management is more focused on achieving the strategic project goals. Contrary to that, the accounting departments do not have much influence on the project planning and control. The production and construction departments possess a greater dominance.

Tab. 1: Project planning and project control

office / department	project planning			project control		
	Median	Mean	S.D.	Median	Mean	S.D.
top management	4	3.4	1.2	4	3.3	1.1
r & d	3	2.9	1.3	3	2.4	1.5
production / construction	2	2.1	1.5	2	1.8	1.6
sales	2	2.1	1.5	1	1.4	1.6
accounting	1	0.8	0.9	1	0.9	1.2
project leader	4	3.2	1.4	4	2.9	1.6
project team	3	2.3	1.5	2	1.9	1.6

n = 39

theoretical range:
0 (minimum: very low)
4 (maximum: very high)

Another aspect is the analogy of the individual departments in developing the innovation projects. A department that plays a (non-)relevant part in the planning process, also plays a (non-) relevant one in the control process. This implies that self-organization is very important in project management. The offices that generate the plan data are responsible for realizing them in an efficient way, as well. Project planning and project control, particularly in the case of managing very innovative processes, are tasks carried out by the top management and the project leader. As a next step, the key persons must be able to co-ordinate their different activities in order to achieve the project goals.

Project goals

The relevance of accomplishing the strategic, technological and economic project goals were questioned to all project leaders and to all leaders of the accounting departments (each variable is measured on a five-point-scale from ‘0 = very unimportant’ to ‘4 = very important’). *Tab. 2* shows the results. First, one can conclude that effectiveness is more important – at least in the case of innovation - than efficiency. Most people of both groups asked assess the goals of cost and time planning realization as unimportant or very unimportant. This result is in contrast to the literature on project management (e.g. Aggteleky 1989) in which a greater importance for project success is attached to cost and time efficiency. However, it must be borne in mind that the investigated product innovations were not already in the selling phase while these questions were being answered. During this stage, economic efficiency goals – still - seem to be in the background. The project team is mainly concentrated on attaining the technological goals.

Tab. 2: Project goals

		Relevance of project goals			Achievement of project goals		
		project leader Median	leader of accounting Median	Kendall's Tau	project leader Median	leader of accounting Median	Kendall's Tau
non-economic dimensions	Achievement of strategic goals	3	4	.664**	3	3	.478**
	Achievement of technological goals	3	4	.642**	3	3	.451**
economic dimensions	Achievement of economic profits	4	4	.311*	3	2	.570**
	Realization of cost plans	0	1	.505**	2	2	.646**
	Realization of time plans	0	1	.508**	2	2	.597**

n = 39 * p ≤ 5% (Kendall's Tau) 3
 ** p ≤ 1%

Secondly, the project leaders and the chief executives of the accounting departments assess the importance of the project goals similarly. This is quite surprising because foreign research has often discovered a different goal estimation (e.g. Brockhoff 1985, Domsch et al. 1991), so far. But these findings stem from different attitudes in r&d and sales departments. In this study, the project leaders and the leaders of accounting departments mostly do not have any problems to consider economic and non-economic goals as equivalently important. This, however, does not mean that there cannot arise a goal conflict during the total project length.

Variants of Accounting for Projects

Verification of project goals

In about half of the cases the accounting department tries to correct the economic project goals. In 11 of these instances the verification of the goals has taken place before the project starts. In 10 cases the targets are checked during the project time. Target verification before *and* during the project time only exists in three cases. This signifies that an inclusion of the accounting department in the innovation process before a project starts can help the firms to avoid prospective economic miscalculation. On the other side, the probability of goal verification will increase if the accounting department is excluded until the realization of the project commences. This is because no one in the project team would pay sufficient attention to the relevance of economic goals unless accountants participate in this process. Such a situation can endanger the total economic success of a project. The innovation could be technologically perfect but not suitable for customers' needs, yet, and therefore not ready for being sold on the market.

Besides, if the accounting department is not integrated in the project's planning phase but has to control the economic status of the project just after the formal starting point, it could feel insulted. This is because the relevant decisions have been made before the accountants have a real chance to influence the project process with the possible consequence that the accountants do not only verify the progress of the important economic goals but also each detail regardless of importance. Research results prove that accountants of those accounting departments that only been included after the project has begun, concentrate on checking cost forecasts and time schedules – although these goals are not seen as relevant dimensions of project success by them. In such a situation, the influence of the accounting department does not reinforce but even hinders the innovation process. In four cases, it is considered to abandon the whole project.

Inclusion of the accounting department in the innovation process

The accounting departments have a lot of possibilities to follow an innovation process. In more than 90 % of all events, the accountants have information rights. Despite that, the official influence potential decreases with increasing significance on the project. In more than 60 % of all cases, the accounting departments are authorized to play a part in the project's goal setting process. In only the half of the cases they do not have any rights to participate in the relevant decision processes, like applying resources, personnel etc. for the project.

Another point worth thinking about is the fact that official influence potential does not necessarily mean the exertion of influence. It can happen that the accounting departments possess various rights to influence the project process but do not use them (theoretically there is also a reversed possibility that the accountants could influence the innovation process without having any official rights to do so; this hypothesis is not verified in the study). The indirect way following the project process dominates in most of the investigated firms. However, the rate of the accountants with information rights having a look at the project files and contacting the project team by phone is under the above mentioned rate of 90 %. Very obvious is the discrepancy between influence potential and actual exertion of influence if it is the direct way following the project process. In less than 30 % there prevails an active co-operation with the project team. Nevertheless, every second accounting department has the right to play a relevant role in the decision process.

After all, the result of this analyzes part shows that it is not sufficient to grant the accountants only give official influence possibilities if the top management of a firm wants them to participate in the innovation process. It is also necessary that the accounting departments themselves actively use these available instrument during the whole innovation process.

Successful Project Management and Accounting for Projects

Economic profits as performance measure for innovation success

In this study, the project success is measured in different performance dimensions: as achievement of the five given project goals questioned to all project leaders and all leaders of the accounting departments (each variable is measured on a five-point-scale from '0 = very low' to '4 = very high'). Although there is no doubt about measuring innovation success in different dimensions that all show various economic and non-economic effects (Hauschildt 1991), everyone wants to obtain one - and only one - clear value ('overall project success') signaling whether the innovation can be successful or not. Theoretically, the overall project success could be a construct developed on the base of the five performance dimensions. But this method would lead to some non-objective solving problems, e.g. weighting the dimensions etc. That is why it has to be checked if one of the investigated performance dimensions could be used as measure for overall project success. Firstly, such a dimension must necessarily have a great project goal importance and secondly, it must correlate significantly with all the other success dimensions.

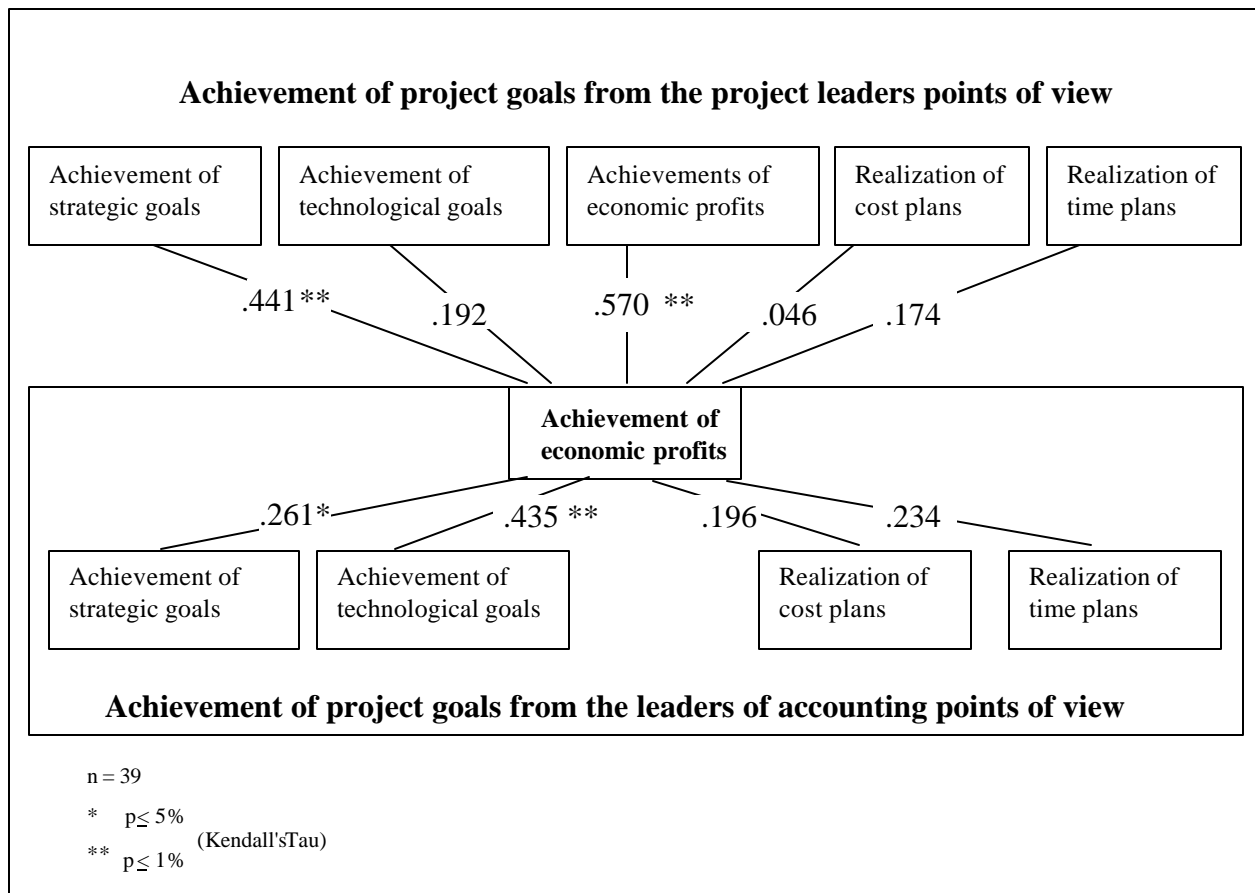
In *tab. 2* it is shown that the achievement of economic profits is the most important project goal. The project leaders and the leaders of accounting departments rate this goal as very important. The medians of these two variables reach the theoretically highest value 'four'. Moreover, there are no significant differences between these two groups in the assessments concerning the achievement of economic project profits. This is also the same result for the achievements of the other four project goals.

Furthermore, it is to be checked whether the achievement of economic profits correlates with the other performance achievement dimensions. But first of all, one has to think about which of the two variables is suitable for being verified. The following two arguments stated by

the leaders of the accounting departments are in their points of view bolstering the achievement of economic profits.

These estimations should be regarded as more valid measures because they stem from people who are mainly not responsible for project success. This does not depend on the fact if the leaders of the accounting departments are highly involved in the project team or not - the project leader is usually responsible for project success. As a consequence, the accountants have a greater distance to the innovation project and should be more objective in their judgements about the project process. Besides, the accountants should be more competent in assessing economic activities than the more technically educated project leaders.

Fig. 1: Economic profits as performance measure for ‘overall project success’



In *fig. 1* the correlation with the other project goals are demonstrated. With only one exception the variable ‘achievement of economic profits’, belonging to the points of view of the leaders of accounting departments, correlates significantly with all the other effectiveness measured success dimensions. Only the achievement of technological project goals from the project leaders points of view does not correlate substantially with the variable stated above. But this correlation is also positive.

The correlation with the efficiency measured success variables are positive as well but they are not significant. These project goals are rated as not very important for the project

success. Therefore, it seems to be justified to ignore that the correlation with the efficiency goals is not significant.

In conclusion it is to be emphasized that the achievement of economic profits (from the accountants points of view) can be a suitable indicator for the overall project success. Nonetheless, it has to be considered that the achievement of effective project goals does not lead automatically to the achievement of efficiency project goals.

Indicating successful projects

At least it has to be tested which of the project management and accounting for projects variants relate to the project success. The project success is measured as achievement of economic profits from the leaders of accounting departments points of view. The variables of significant success factors are listed in *tab. 3*.

Tab. 3: Success factors of project management and accounting for projects

Variables	economic project success
A. Project management	
- project realization by top management	.315**
- end of project organization after introducing onto the market	.250*
- number of full-time workers in the project team	.275**
- number of engineers in the project team	.308**
- number of commercials in the project team	.273**
- project costs in relation to sales	.303**
- project financing by budgeting	-.324**
- project financing by sponsoring	-.226*
- project control by sales department	.229*
- relevance of achieving economic profits from the leaders of the accounting departments points of view	.372***
- relevance of realizing cost forecasts from the leaders of the accounting departments points of view	.222*
- relevance of realizing time schedules from the leaders of the accounting departments points of view	.308**
B. Accounting for projects	
- goal checking	-.237*
- cost accounting	-.302**
- profit and loss accounting	.413***
- looking at the project files	-.246*
n = 39	
* p ≤ 10%	
** p ≤ 5% (Kendall's Tau)	
*** p ≤ 1%	

Conscious Cooperation Between Engineers And Commercials Within The Project Team

A heterogeneously compound project team is a very important success factor. The fact that engineers and commercials are put together in the same team increases the project success. The great advantage of this combination is the possibility that an active conflict management can be used within the project group. Arising problems can be discussed in an open atmosphere. Such a discussion supports the understanding and acceptance of both project goals, technically and commercially oriented ones. Solutions in order to find compromises can be developed together and therefore being based on common sense, e.g. in finding the right period for introducing the innovation in the market. This is one of the typical conflicts between engineers and commercials. The engineers want the product to be introduced as late as possible in order to strive for and develop technical perfection. In contrast, the commercial side advocates an market introduction as early as possible in order to ensure the capital expenditures for the innovation. In such a situation a heterogeneous project group helps recognizing problems early and solving them together during the total project time.

Great Importance Of Economic Project Goals In The Innovation Process

The next relevant success factor is the great importance of economic project goals. The attention paid to economical, effective and efficient project goal seems to be a necessary condition for the innovation success. It is recommended that the accountants should be included in the innovation process as early as possible. Accordingly, an innovation process mainly focusing on attaining technological goals does not have much prospect of succeeding. The only concentration on technological aspects is due to situations, in which the accounting department is forced to inform about the economic project process. Without knowing anything or only a little bit about what is going on in the project, the accountants want to have a look into the project files and tend to advocate goal verification. In such a situation, the accounting department very often develops a negative attitude not only towards the single project details but also towards the whole innovation. This development does not lead to an increase of the project success.

Profit And Loss Accounts Dominating Cost Accounts In Project Management Accounting

The great importance of economic goals plays a relevant role in the innovation process though not all accounting instruments do have effects supporting the project success. A positive correlation with project success has only the use of profit and loss accounting. The usage of cost accounting correlates negatively with the project success. These results lead to the conclusion that in case of innovation the application of cost based accounts should come second to the use of profit and loss based accounts. The question is not 'what could be the costs of the project?' but 'what could be the earnings of this project?'. Considering and analyzing only the innovation costs could become a barrier to the innovation. Opponents to innovation could use the cost accounts for voting against the innovation. Without a future oriented accounting thinking in costs and revenues, the economic effects of innovation projects on the companies' profits would not be clear and transparent for everybody. For this reason, it is recommended to use an innovation profit and loss account in the internal management accounting system (Littkemann 1998).

From the accountants' points of view, innovations are investments (Hauschildt 1997). They are usually very risky, very expensive and are triggered off by the expectation to earn money in the future. The innovation process lasts for several periods. Hence, a profit and loss account for innovative projects is needed that is non-periodical and deals with accumulated costs and revenues and some future data (see *tab. 4*). If the innovation is treated as an investment in the management accounting system, the innovation process will be much more successful.

Tab. 4: Conceptual framework of an innovation profit and loss account

Revenues	Costs
1. Realized (accumulated) revenues	3. Realized (accumulated) costs
a) external over market e. g. licenses	a) external over market e. g. desks of construction, office supplies
b) internal from other projects e. g. transmission of research results	b) internal from other projects e. g. salaries
c) other revenues e. g. subventions	c) other costs e. g. charges
2. Future (estimated) revenues	4. Future (estimated) costs
	5. Innovation success Revenues (1. + 2.) – Costs (3. + 4.)

Furthermore, the results show that project financing by budgeting and sponsoring, e.g. obtained money from the government or a group of companies, relate to negative project success. Both ways of financing reduce the success orientation coming from the market. For each innovation it is to be checked with profits and loss accounts whether the project is profitable in the future or not. Possibly, the in- or external random factors could have changed with the effect that successful project termination is not attainable any longer. In such a scenario the project should be stopped (Balachandra/Raelin 1980) regardless of the money that has already been spent for the project till that moment. The decision to abandon the project helps to avoid future losses. Money allotted to such a project, which is not profit oriented, delays or even prevents a necessary project abandonment. In this situation it is unimportant whether the money comes from in- or outside the company.

Leading Position Of The Project Within The Company

At least, bringing the innovation project in a leading position within in the company is a relevant success factor. The fact that the top management is highly involved in the innovation process and that the project has a lot of people working together in a team reflects the strong strategic position of such a project. These aspects lead to a situation, in which everybody within the company knows about the innovation. Additionally it is shown that the project is important for the whole company, especially if the top management participates in the project realization. In such an environment, opponents rejecting the innovation do not have much power to produce their arguments.

Conclusions

The instruments of project management are often used in the investigated 39 innovation processes. In the framework of project planning and control the project leaders and members of the top management are the leading key persons of the innovation. They are champions of the innovation, working together, blocking or hindering opposition and reinforcing the project success (Littkemann/Schewe 1998). Technological aspects dominate within the process though commercial aspects are also taken into consideration.

Project leaders and leaders of the accounting departments accept the importance of economic and non-economic project goals. They agree with each other that effectiveness should be much more relevant for the success of an innovation process than efficiency. Attaining economic profits seems to be a correct measure for 'overall project success'. In half of the analyzed innovation processes the accounting departments first of all try to verify the project goals. Then, they concentrate on checking the cost forecasts and time schedules.

The accounting departments have a lot of possibilities to follow the innovation process. These influence potentials, however, mainly focus on the information rights. Mostly, the accountants are not authorized to participate in the relevant decision process. Moreover, the accountants often do not use the provided influence potential.

Successful project management and accounting for projects are based on the following key factors: conscious co-operation between engineers and commercials within the project team, great importance of economic project goals in the innovation process, profit and loss accounts dominating cost accounts in project management accounting and leading position of the project within the company.

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Joern Littkemann, Institute for Business Administration, University of Muenster
Universitaetsstr. 14-16
D-48143 Muenster, Germany
Email: 19joli@wiwi.uni-muenster.de

Dr. Joern Littkemann is Associate Professor of Business Administration at the University of Muenster. He is involved in teaching and research in Innovation Management and International Accounting. The author has numerous publications in diverse German journals including *Zeitschrift fuer Betriebswirtschaft*, *Die Betriebswirtschaft* and *Die Wirtschaftspruefung*. He belongs to the review board of *Zeitschrift Fuehrung + Organisation*. His practical experience includes work as tax consultant in different companies.