

AN EXPERIENCE-ORIENTED APPROACH TO RISK OF POSTPONEMENT IN INVESTMENT PLANNING FOR A DISTRIBUTION NETWORK OPERATOR

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ABSTRACT

This paper presents an objective, flexible and expandable model of dealing with the risk of postponement (rop) of projects in the investment plan. The 3 factor (3F-) method is used to assess the general (risk group specific and experience based) and individual (project specific) postponement risk of every project. The result is a rop priority index for the investment plan as a quantified guide for project urgency.

INTRODUCTION

Investment planning is a crucial element in the value creation chain [2], besides operating expenditures planning, which itself depends on the first, on the assets and on their management.

Investment always deals with risk [4], many projects contained in the investment plan passed, as business cases, a risk analysis as well as a profitability analysis.

Often the time schedule of investment projects, as e.g. the refit of a transformer station, has to be “shifted right”. This may be as a simple consequence of lack of financial resources, which may have many different causes - e.g. some major event or a great number of small events in the asset - but also organizational or regulatory changes in our faster and faster changing surroundings.

The interesting question is then which projects to prioritize and which to delay, especially among projects comparable in profitability on the one hand and among completely different project types (e.g. a new or refit of a transformer station versus new cars for the company) on the other hand.

An approach to this issue is the “risk of postponement” (rop), an attempt to quantify the project urgency. The methodology must be a real-world one, practicable as a commitment for technical and business experts.

THE RISK OF POSTPONEMENT MODEL

An overview over the approach is shown graphically in Fig. 1. The first step to reduce complexity [3] is to cluster the projects into types. In our case a simple classification was given by SAP accounting. This can be the types to start with, further types rise as different postponement risks come upon (e.g. a refit of an existing versus a new facility).

An early conclusion in our model was that the rop of a project type has risk components depending upon its context (general) and depending upon the project itself (individual).

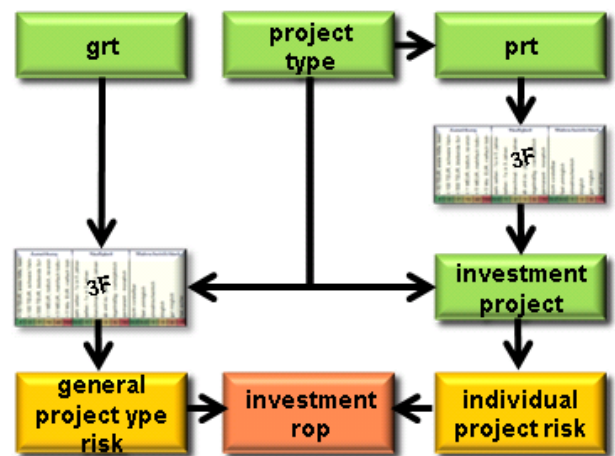


Fig. 1: Evaluating the risk of postponement (rop) – assessment of general and individual project postponement risk components using the 3 factor method (grt...general risk types, prt...project risk types, 3F...3 factor method)

The 10 general risk types (grt) were quickly found in literature and clustered as shown in figure 2. Some examples of the issues included are listed for every issue. E.g. the general risk type “staff” deals with the just-in-time availability of the employees necessary, should a project of this type be delayed.

general issue	examples for risks
market	purchasing, claim
staff	human resources
economy	prices, cost, interest rate
technical	technology, age, condition
law	limit values, labor legislation, permits, prescriptions
security	theft, data, patents
administrative	planning, organizational
political/social	owner, government, regulation
nature/3 rd party	flood, heat, storm, vandalism
IT, telecommunication	hacker, communication

Fig. 2: General risk types

The project types used are shown in figure 3.

switchgear - EHV/HV - new
switchgear - EHV/HV - renewal
switchgear - EHV/HV - upgrade
switchgear - MV/LV - new
switchgear - MV/LV - renewal
switchgear - MV/LV - upgrade
grid - EHV/HV - new
grid - EHV/HV - renewal
grid - EHV/HV - upgrade
grid - MV/LV - new
grid - MV/LV - renewal with substations
grid - MV/LV - renewal without substations
grid - MV/LV - upgrade
business and service
IT, meter, administration

Fig. 3: Relevant project types

The grt were assessed for every project type using the 3F-method [1]. Using the method, severity, frequency and probability of a problem resulting from (here) a delay are estimated and as 3 factors, multiplied.

The entries are experience based, in some workshops experts and project managers agreed on a classification, taking into account recent projects and difficulties they encountered in the past after having postponed them. To stay with the last example, missing staff caused by postponement would have a severity by a frequency by a probability for a project type.

The quantified result of this grt assessment is shown in figure 5.

In this first assessment phase new project types were generated where needed – where the assessment of the general risk type of two projects of the same project type completely differed.

The individual rop part depends on the project itself. Classification is only available through deep-in knowledge of the specific project and can be only described by the project managers themselves. An in-depth analysis as used for the grt by the project managers is not practical and would not be accepted.

Thus a two-stage approach was chosen.

As a first step prt for every project type were defined and assessed by experts (only once, as the grt), as a second step the project itself was chosen a type and the project was pulldown-menu risk-assessed by the project manager, at the point when the project is being submitted (see figure 1, right side, box “investment project”):

severity						frequency						probability																							
< 10 TEUR, hardly noticeable, no environmental impact < 100 TEUR, injure, reversible, appreciable < 500 TEUR, resident injure, reversible in 6 months < 1 MEUR, deadly, reversible in 2 years < 5 MEUR, deaths, rev. in 5 years, threats company existence > 5 MEUR, many deaths, irreversible						very seldom – 1 x in 5 years seldom – 1 x in 3 years sometimes – 1x in 2 years every once a while - yearly periodical - quarterly often - monthly						not conceivable nearly not possible unlikely possible potential nearly certain																							
																		1	3	7	15	40	100	0.5	1	2	3	6	10	0.2	0.5	1	3	6	10

Fig. 4: The 3 factors of the 3F-method (result = product)

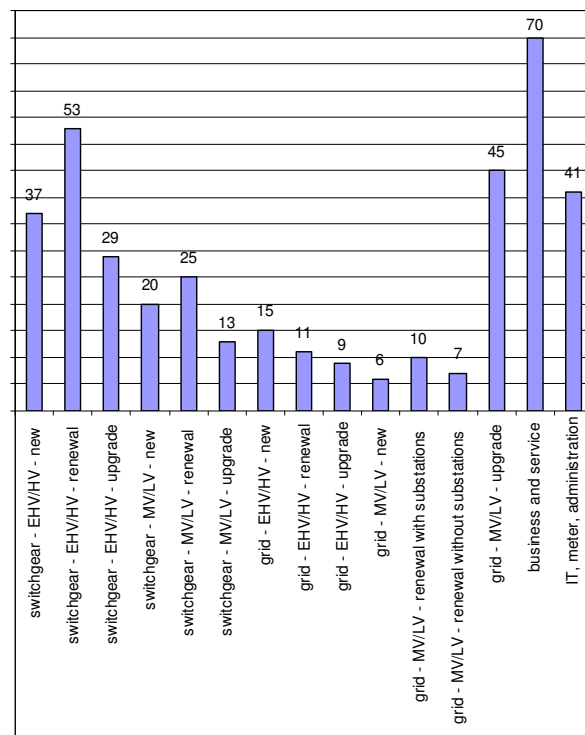


Fig. 5: Quantified result of the general risk types assessment for the project types used

Clustering attempts for real-life projects led to a number of individual risks, each of them increasing the project urgency, different for the project types. These additional hot keys were limited to 3 to 5 prt per project type, less were allowed.

Key points for the prt concept are clear interpretability by the project manager in the formulation and easy accessibility in the real-world forms to be filled in into proper forms, e.g. dropdown boxes in the investment description form, with meaningful boundaries, e.g. an age in which the component should be ok, one where it could fail and one in which something has to be done, all based on operational and troubleshooting experiences.

An example for prt for a project type is shown in figure 6. Every single state of the prt for every project type was assessed using the 3F-method. The quantified outcome is again the product of the three factors. According prt and its states it is crucial to leave room for different interpretations paths, as projects do differ.

project risk type	state
by force of third party	yes, no
condition	excellent, good, bad, critical
age	>40, 20-40, <20
voltage level in kV	380, 110, 20, 10, 0.4

Fig. 6: Example for project risk types for a project type (here 4 of the maximum 5)

The next target was to aggregate the data acquired from the project type specific prt and the project type and project itself specific prt. Figure 1 shows the entire process how the rop was determined.

Based upon the assumption, that the criterions were chosen as independent as possible from each other, a simple scoring method was chosen.

Weighting, as a first step, can be implemented by dividing by the number of criteria.

To emphasize the accelerating effect of up to five type specific prt, everyone influences the individual part of the rop roundup only by 1/5, even if less than 5 are present.

A true miss-assessment in a single criterion gets reduced by the number of criteria this way. It is always to be kept in mind that a single (“not too wrong”) classification doesn’t completely destroy the scheme. It is biased out by other criteria.

The rop of the potential investment can be be visualized in different ways, from traffic light colors, over the score up to dependencies on project type, cost or profitability.

RESULTS AND OUTLOOK

The outcome of the rop assessment is a verification and sometimes even a much better quantification of decisions. Investment projects that must be done glow up red, other able to wait stay green.

Asset management decisions not easily comprehensible for project managers until now – sometimes focused only on their area of interest, not to say professionally

blinkered, - may suddenly seem obvious.

Urgent projects, that must be done, e.g. for safety or legal reasons, are clearly shown to budget owners. There are tons of interpretation possibilities cross-comparing to profitability, investment volume, project type classifications etc.

Two general examples for data usage are shown in the last two figures.

Figure 7 shows the average rop of project types in an investment plan. In this diagram the EHV/HV and business/service projects can be interpreted most urgent, while the average investment volume of them per year is moderate.

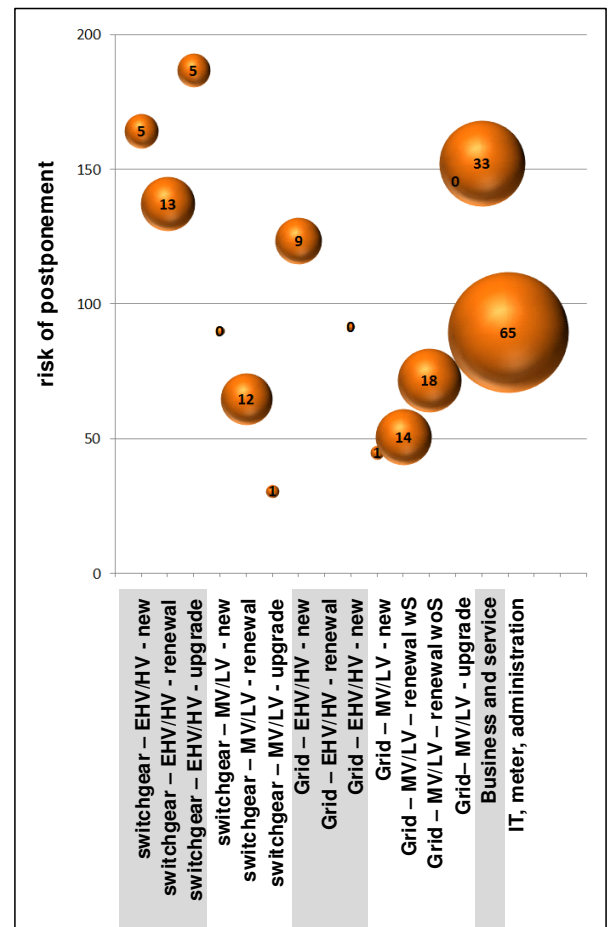


Fig. 7: Example for rop assessment results – rop versus average project type and size in the investment plan

Figure 8 offers an overview over project volume versus rop. Again you can see that time-critical project are usually of moderate size, in this example below 5 Mio. EUR per year.

Of course this can not be the only method to classify or risk-model incoming projects. As mentioned in the beginning, often a risk analysis as well as a profitability analysis are already at hand.

This methodology can be seen as a promising additional information for the asset management and an interesting

interface between technical and financial controlling at the stages of short- and mid-term investment planning.

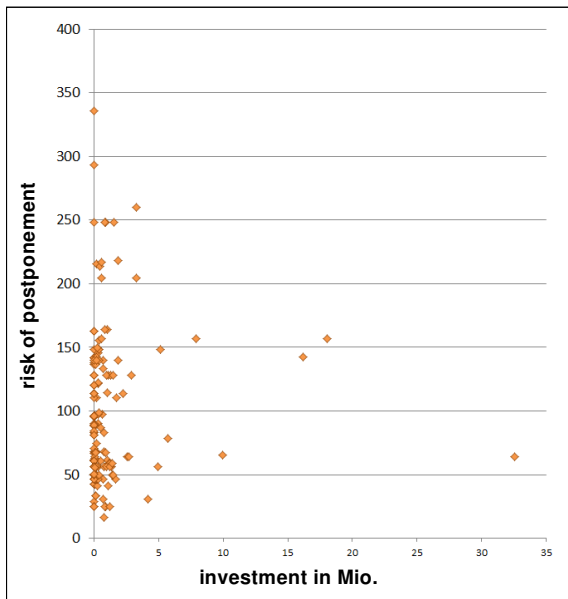


Fig. 8: Example for rop assessment results – rop versus project investment volume

At the moment an appropriate expert scheme for an yearly investment plan of over 100 Mio. EUR and over 100 projects is being researched.

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