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MY FIRST LONG-TERM TRIZ-BASED PROJECT IN HEILBRONN

Ahmad-Ramez Kassou

NPK-Consulting, Moscow, Russian Federation

Paper Classification:

X Best practices, business experiences, integration with non-TRIZ methods/tools
X Case study

Abstract

Keywords: TRIZ Toolbox, Invention-On-Demand (IoD), Purchasing Chessboard™, Project, Roadmap.

In March 2009, one-year innovation consulting project for given short-to-mid term objectives was implemented at a manufacturing company in auto industry (located in Untergruppenbach, Heilbronn district). This cost-reduction project included a vital part - technical investigation of specific electro-mechanical product lines – models of a vehicle transmission (gearbox), performed via IoD approach (TRIZ-based methods) of Purchasing Chessboard™ strategy [1]. The article overviews roadmap, phases and main characteristics of that project, with additionally extracted business risks and recommendations for similar practices.

1 Project

Cost-reduction expertise (due diligence consulting)

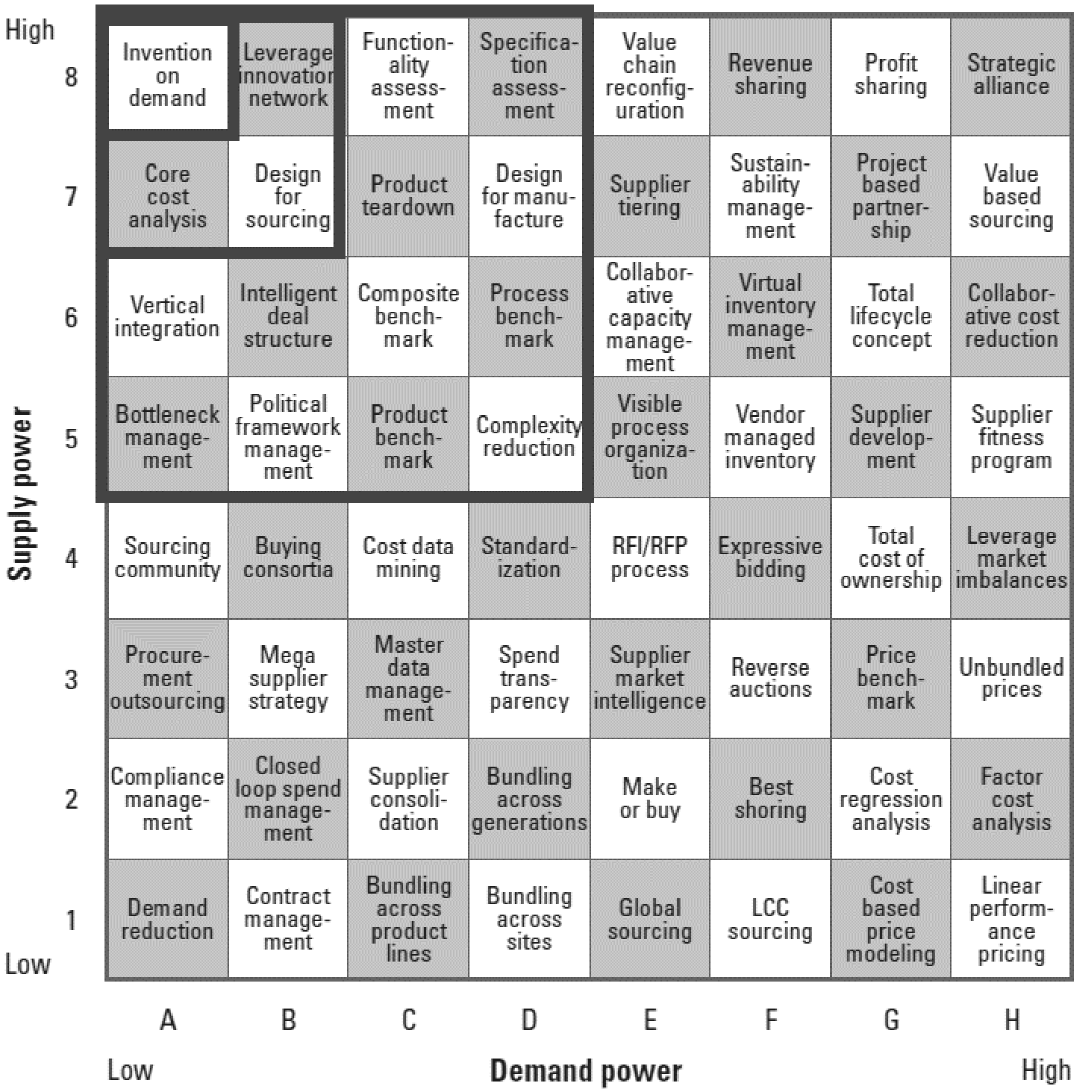
In terms of developing engineering systems, this project belongs to "Design-to-cost" type of innovation processes (or Cost reduction TRIZ-based project [2]) and had some vital features which built the successful story:

- Deep slow iterated and repeated process of knowledge transfer (Engineer-to-TRIZ Expert; TRIZ Expert-to-Engineer).
- Tight and continuous collaboration with procurement consultants and business analytics. Intermediary checkpoints with top-managers.
- Business cases built and evaluated (substantiated) at the end of technical research to match given business and commercial targets (e.g. % of reducing the cost of systems/subsystems/components within 2 or five years).
- It was normal not to deliver a WOW-effect to the Client at the end of project (the percentage of cost reduction is predicted and regulated without any extra values). But this effect

might be provided during the process of developing engineering concepts, sometimes competing with existing on-site engineering practices, experience etc.

The challenge of developing technical innovation in combination with reaching aimed commercial targets faces complicated administrative restrictions when the TRIZ expert attempts to estimate accurately the found feasible opportunities of product designing (a huge amount of variations and concepts generated by multiple solving directions which should be verified by multiple departments and stakeholders).

After determining the strategy of project development (In our case it was via applying multiple approaches of Purchasing Chessboard™, including IoD, see Fig. 1.), the roles of project team were distributed and pushed in parallel processing. That means, each team member has his(or her) own developed sub-project (TRIZ-based project pipeline was defined as well, see Fig. 2)



Source: A.T. Kearney

Fig. 1. Purchasing Chessboard™

As any other type of project this one started with a data gathering sessions with stakeholders/engineers and by “living” in manufacturing/testing zone. Then, the data gathering repeated 2-3 times during the process of verifying key disadvantages and problems.

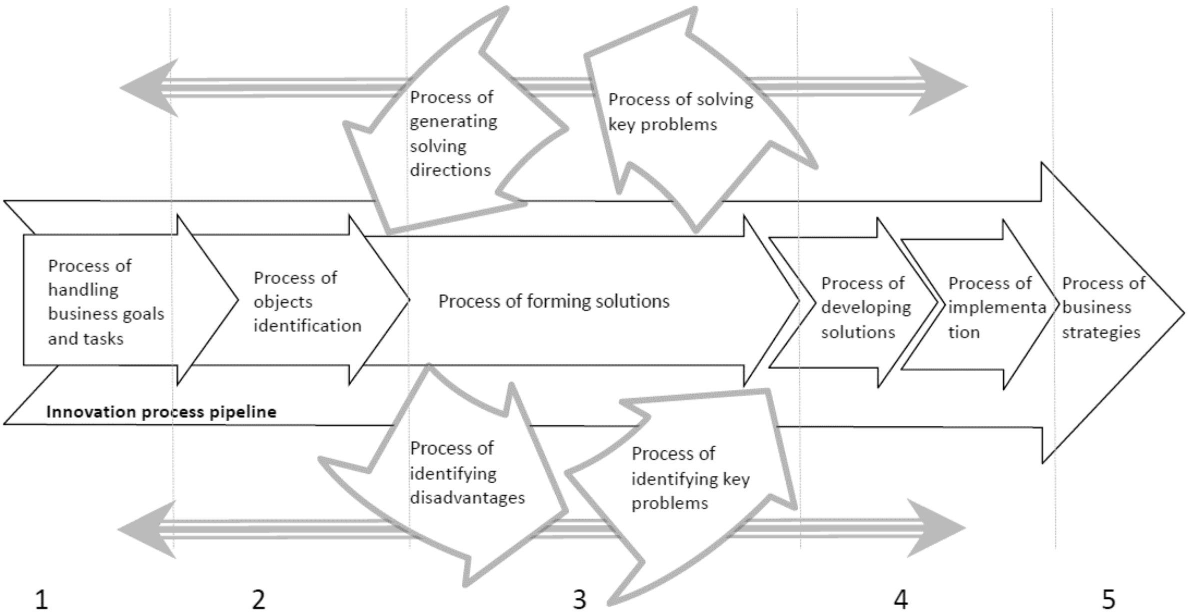


Fig. 2. High-level project roadmap of TRIZ involved partition

The main TRIZ analytical toolbox is located in phases 2-3. Other procedures are complementary and can be combined with other non-TRIZ methods and fields, e.g. business analysis, commercial investigation, lean approach, etc.

The processing cycle of phase 3 (problem identification and solving) in reality was much more complicated in accordance to the complexity of systems/subsystems (high level-to-low level disadvantages and resources). Here, it is significant to realize that the incremental cost reduction findings traditionally lie within small elements which are used for multiple purposes simultaneously and frequently. So the inventory analysis was required behind the component analysis to decide which degree/characteristics of function modelling had to be designed and handled.

2 TRIZ relation

In this project up to 3 product lines where selected to consider their evolution and cost improvement. Manual and automatic transmission products have various complexity of subsystems, applied technologies and sciences. This complexity of systems was studied and clarified by performing component modelling (see Fig. 3.) and function analysis (see Fig. 4.). A long list of hierarchically ordered internal technical disadvantages and key problems was extracted and formulated and comprehensively described to go ahead with solving tools (mainly through general scientific problem/solution toolbox).

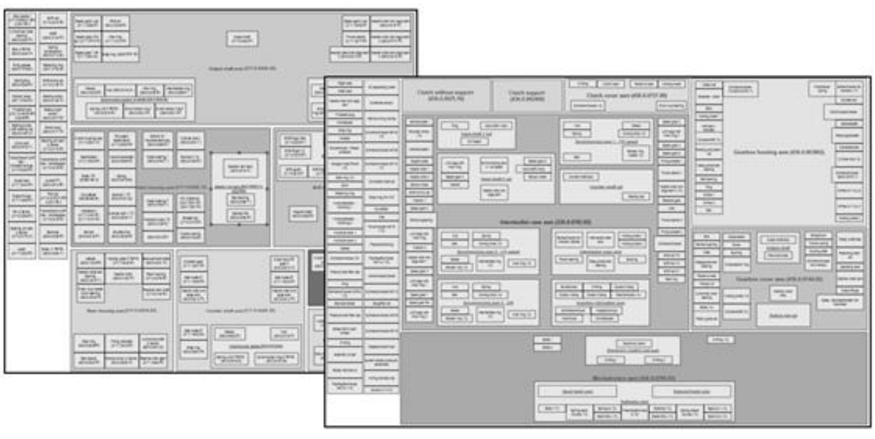


Fig. 3. The complexity of subsystems and component structures (Sample)

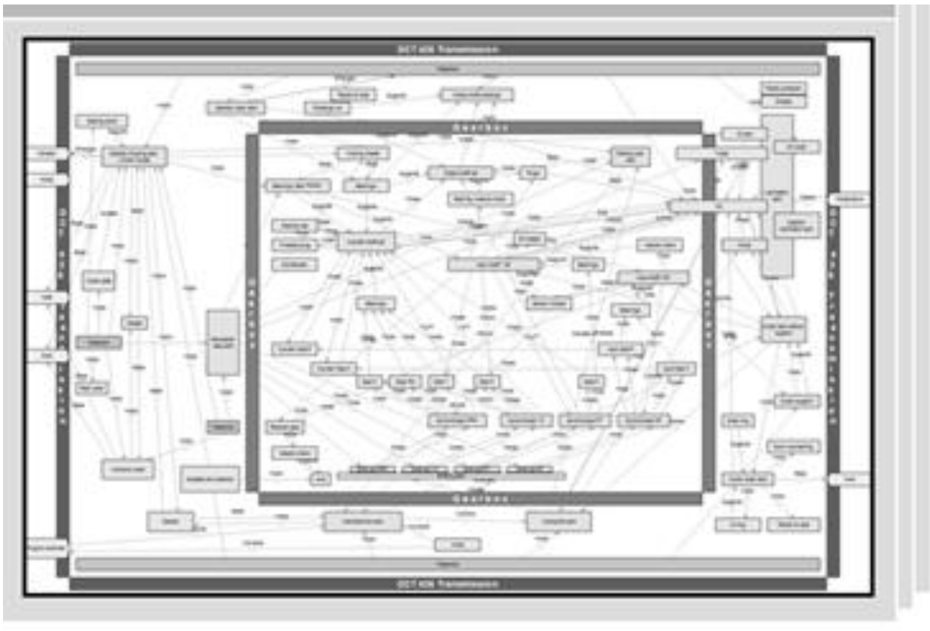


Fig. 4. The complexity of function modeling (Sample)

The function analysis enabled starting the cost analysis of elements/functions at the beginning of innovation process (see Fig. 5.)

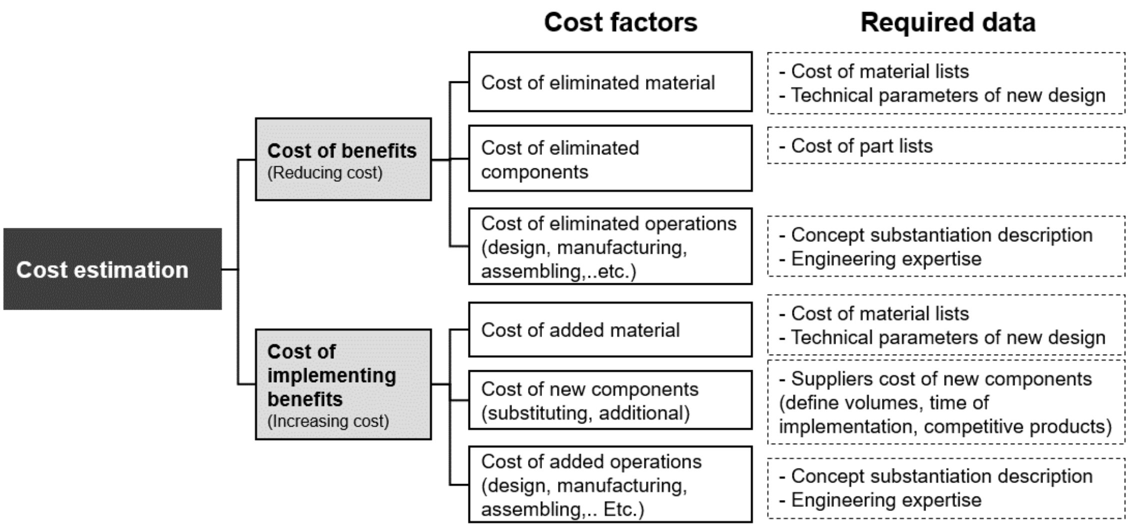


Fig. 5. “Design-to-Cost” estimations

At this stage it is not so significant to consider accurate data of cost estimations which should be approved by financial documents. This accuracy, as mentioned before, will be required in final phase (during filtering generated and well-described concepts).

Hundreds of elements (components with systems) had tens of interconnecting disadvantages had to be sorted, ranged and simplified to enable the generalizing approach. Formulating contradictions here also had a specific use, the dramatic and radical ones should be rare and which can solve common tasks of all considered product lines simultaneously. This might ensure that the developed long-term solutions will be valuable for Client’s business strategy.

3 Results

Describing the innovation process (see Fig. 6.) provides a platform for coordinating connecting sub-processes with activities of other team members.

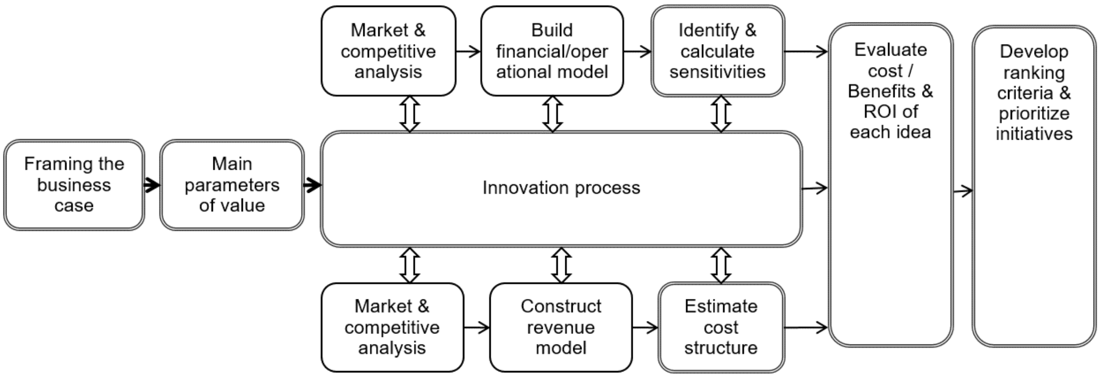


Fig. 6. Innovation project roadmap in terms of processing

The innovation process handles an amount of generated solving directions, then checks their feasibility, and the same for generated concepts (see Fig. 7.). The arguments and parameters behind such filtration will fix the time category of implementation.

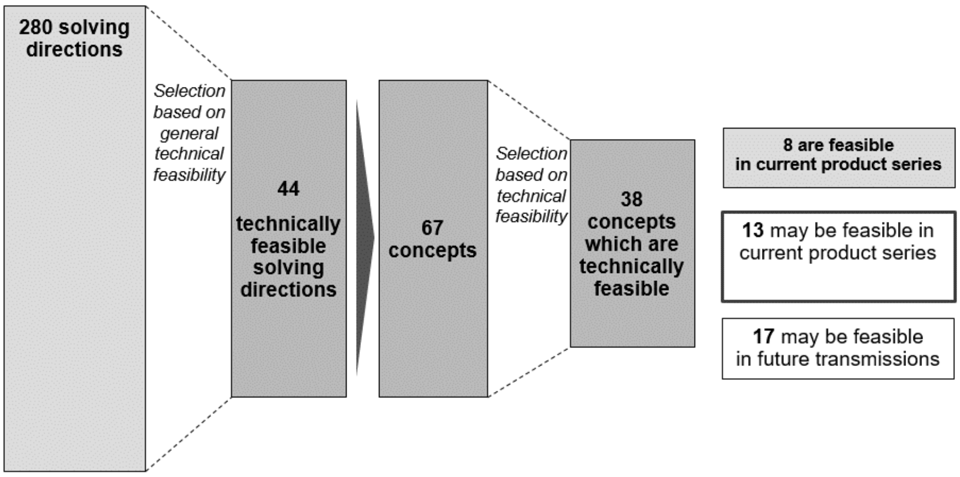


Fig. 7. Process of filtering concepts

Project deliverables are then divided into three categories: Business cases with detailed cost-benefit analysis for immediate applications (Up to 5 concepts); Business cases with detailed cost-benefit analysis for applications with potential for current series (Up to 10 concepts); Report on long-term strategies (Up to 20 concepts).

The output of such innovation process is a set(s) of well-described concepts with mapping on time-scale diagram of implementation (see Fig. 8.). The map is flexible enough to tune the position of each concept to reach the final verified state.

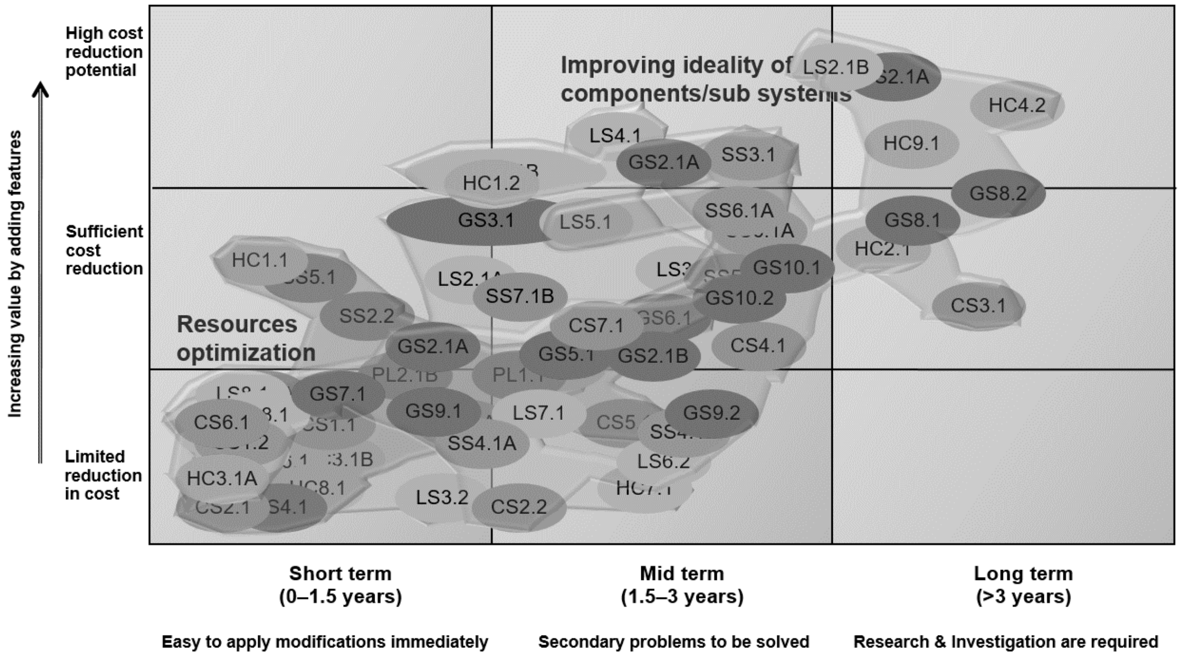


Fig. 8. Cost reduction strategies and box of solutions

To meet the business targets, it is not only reasonable but obligatory to build business cases with accurate ROI data, and then snapshots to present the most impressive and valuable ones. In our project, the business cases of feasible concepts in current product series are formed using unified and clear template (see Fig. 9.).

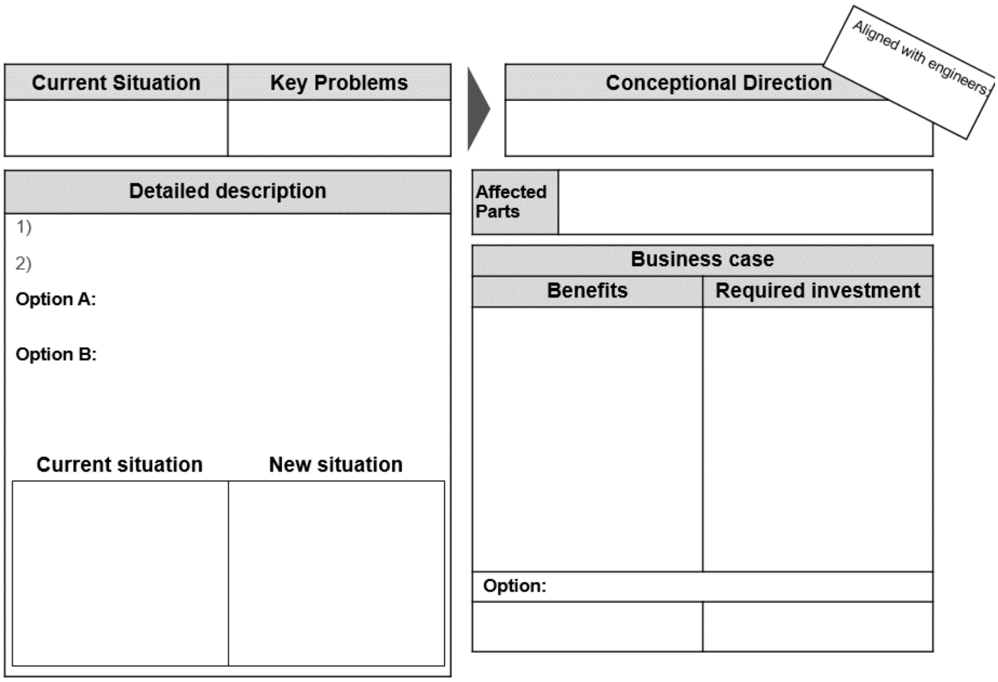


Fig. 9. Template for presenting final business cases of short-term solutions

At the end, here are some aspects and issues which should be considered by project managers to deliver the achieved technical success.

4 Conclusions

The project risks (to be recognized and compensated beforehand):

- Losing hidden values (for example MPV's) while analyzing complicated structures and huge function models.
- It is almost impossible to substantiate solutions of short-to-mid term objectives (incremental and continuous cost reduction) in high-tech industrial fields, if they are extracted through radical TRIZ-based methods (e.g. radical trimming, IFR, solving powerful contradictions and others).
- The lack of sharing WOW-effects on project checkpoint meetings. Most of concepts are logically extracted, calculated and strongly filtered by business analytics (of both client and their consultants).
- Global ones: E.g. Effects of financial crisis, events of regional economy, changes in company polices, strategies etc.

Factors of success and recommendations:

- The key engineering personal should be involved and motivated in developing the list of key disadvantages/problems/solving and even in presenting concepts. The motivation here is obtaining new analytical skills of innovation.
- Increasing as much as possible the amount of workshops and data gathering sessions in production zones (normally this opportunity is limited to outsiders)
- Improving the level synergy within client's internal processes and representatives (people, sites, management services) can be enabled through projecting via existing engineering environment/approaches/facilities.

References

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Communication

Communicating Author: ramsess2@protonmail.com

Communication acceptance: With the submission of the paper the authors accept to be contacted by MATRIZ representatives for TRIZfest purposes.