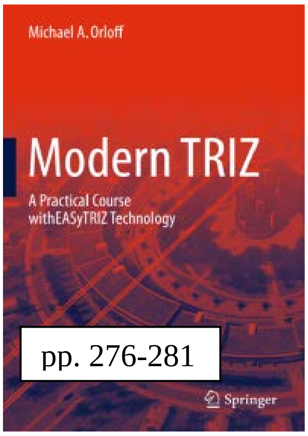

11 Energy of Progress

11.1 On the Way to a New Innovation and Invention Theory

The future of any state depends on its intellectual potential, ability to produce innovative ideas and resolve constantly emerging contradictions of growth, and ability to project the course of events and, based on such projections, mitigate risks and maintain sustainable progress. This thesis can be illustrated by the following description of strategic platforms which generate positive driving forces and define the general vector of development at various stages of human history (fig. 11.1).

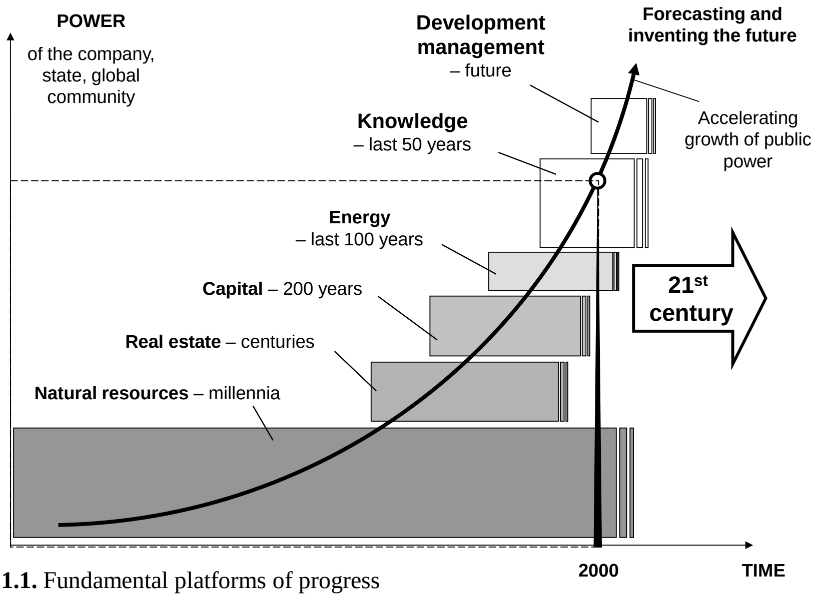

fig. 11.1. Fundamental platforms of progress

Particular strategic importance is ascribed to the intellectual potential of a special type – that related to inventions and innovations. It is the inventive creative energy that puts society into motion, promotes technical and then social progress, creates leadership through inventing large- and small-scale solutions for production, education, politics, and all other areas of human activity.

It is this aggregate inventive potential that encourages global economic change, sustainable increase of the quality of life, reproduction – generation after generation – of talented people motivated to creatively fulfill their potential for their own benefit and for the benefit of their families, their collectives, their people and the state.

Repetition and borrowing does not create leadership by definition. Leadership requires pioneering innovations and inventions. And that calls for theories and practical methods that inherently have everything that it takes to assure subsequent development and mutual enrichment through joint utilization of intellectual treasures amassed in the fields of engineering, philosophy, sociology, politics, and virtually every other area of general theoretical and applied knowledge (fig. 11.2).

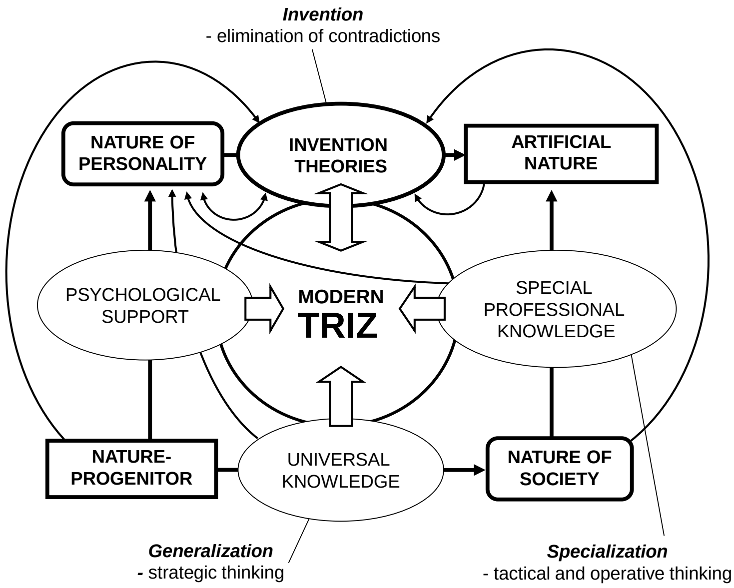

fig. 11.2. Formulation and application of invention theories

We need to critically review the principles and mechanisms used to accumulate and propagate the intellectual potential of the state.

Paradoxically, until now there has been no place in the world where creative invention methods and models would be collected, reorganized and reinjected into everyday practical work.

Experience accumulated by outstanding innovators and inventors is not studied or generalized, it is not transformed into new knowledge, and it is not taught to innovators and inventors of new generations. Each innovator has to walk by himself the same "path of errors" as his predecessors. How preposterously and wastefully archaic!

Mankind loses – almost irretrievably – gigantic intellectual riches embodied in the knowledge and skills which reside in innovators and inventors! These riches are not accumulated, not studied, not transformed into new intellectual resources that can be used to encourage further public progress!

> The only trail-blazing example of systemic scientific study of inventions is presented by TRIZ. However, TRIZ is not spread throughout the world to the extent that it definitely deserves. Besides, TRIZ itself is in need of radical renewal and transformation.
>
> And the first thing that has to be done in this respect is to create TRIZ presentation models and methods that would assure simple and rapid internalization and correct utilization of TRIZ fundamentals. This is the starting point of Modern TRIZ.

To implement this new stage of development, it is necessary to retrace – at this new turn of the spiral of history – the path walked by G. Altshuller and his successors at the time when TRIZ emerged as an independent discipline. This means that it is necessary to perform – again! – selection and analysis of empirical material.

There is no other reliable way. Only from practice to theory. Naturally, subject the fact that study of new empirical material can and should be approached from a modern theoretical platform.

However, before we undertake such full-scale study, we need to outline, at least briefly, the current state of innovative analysis. And when we do that, there will emerge an amazing picture reflective of the real understanding (or, rather, "non-understanding"!) of the real attitude of managers operating at all levels of corporate organization both to TRIZ and to teaching innovative thinking.

11.2 Opel, VW and Others: "Masses VS Elite"

First let us analyze economic efficiency of innovations created at one or two large industrial enterprises in Germany. This will give us an idea of the state of affairs in a large industrially developed country, and help us decide whether there is any sense at all in theorizing about innovations and inventions. Then, based on the results of that analysis, any concerned reader will be able to come to his own conclusions subject to his preferences and interests.

Evaluation of economic efficiency is performed by extrapolation and multiplication of real-life data from two large German carmakers – Open and Volkswagen (VW) – which we believe to be reliable benchmarks for our purposes.

In our evaluation, we will use the following method:

- first, we research the volume and economic efficiency of innovative proposals filed by employees of the two companies;

- taking into consideration the mass-scale nature of innovative proposals filed at the benchmark companies (tens of thousands per year with the participation of tens of thousands of innovators), we then assume that the ratio of intensity of innovations and their average economic efficiency will be approximately the same at all automotive industry enterprises;

- finally, we perform proportional linear extrapolation of economic efficiency figures posted by the benchmark companies to the entire industry based on some common indicator, such as the number of employees.

Example 11.1. Economic efficiency of innovations.

The table in fig. 11.3 contains public information about innovative activities at Opel and VW enterprises. Asterisks (*) mark confirmed reliable data obtained from open sources. Other data are approximations and derivations based on certain assumptions.

No.	Indicator ↓ Company →	Opel	Volkswagen
01	Number of innovative proposals per year	72,791* (2001)	150,000* (2006)
02	Annual economic impact, € million	75*	168*
03	Average economic impact per proposal, €	1,000	1,120
04	Fees paid to innovators, € million	11*	23*
05	Average annual fee per proposal, €	350	153
06	Total number of employees	33,000*	151,000*
07	Number of innovators	8,250	37,750
08	Average number of proposals per innovator	9	4
09	Number of outstanding innovators	28*	49*
10	Fee per outstanding innovator, €	51,000*	51,000*
11	Efficiency of outstanding innovations (at least), €	400,000*	400,000**
12	Contribution of outstanding innovations to annual economic impact, € million	11.2	19.6
13	Contribution of outstanding innovations to annual economic impact, %	15	12
14	Contribution of "mass-scale" innovations to annual economic impact, € million	63.8	130.4
15	Contribution of "mass-scale" innovations to annual economic impact, %	85	88
16	Economic efficiency ratio per "outstanding" idea	400 : 1	400 : 1
17	Ratio of "outstanding" ideas to total ideas	1 : 2,600	1 : 3,000
18	Ratio of "outstanding" innovators to total employees	1 : 1,200	1 : 3,000
19	Ratio of "outstanding" innovators to total innovators	1 : 300	1 : 770

** Efficiency figure is extrapolated from the Opel indicator due to the lack of reliable data on VW.

fig. 11.4. Reinventing as an MTRIZ-based reconstruction of the inventing process

Taking into consideration the fact that, on the average, only 25% of employees at both companies file innovative proposals, the average number of proposals per one active innovator ranges from 4 to 9 (line 08 in table 1).

Line 15 confirms that the "bulkiest" contribution to total economic efficiency is made by "mass-scale" proposals. Their share amounts to at least 80%, while "elite" proposals account for about 20%.

Line 16, however, shows that "outstanding" innovative proposals boast much higher "individual" efficiency, beating the averages by hundreds of times!

It should be noted that "outstanding" innovations are mostly represented by solutions of particularly complex technical and technological problems resulting in revolutionary breakthroughs in the ongoing development of products and technologies. Without such innovations, progress becomes impossible.

> That is why "outstanding" innovations cannot be replaced with "mass-scale" innovations – these phenomena have different nature and significance. However, in terms of aggregate economic efficiency, contribution of "outstanding" innovations to the annual bottom line can be less weighty than that of "mass-scale" innovations.
>
> Here is some food for thought: on the one hand, not even a million high jumpers showing average results can replace one record-breaking high jumper; on the other hand, no outstanding soccer player can play alone against a full team. Both examples are important, because they are about attaining different objectives.

The method demonstrated above, and the results obtained, are sufficiently reliable to perform approximate calculations. A similar method is used by the German Economic Institute to evaluate efficiency of innovative proposals filed by employees of German industrial enterprises.

The following data published by that institute are important for our subsequent calculations:

a) in 2007 the aggregate economic impact of innovative proposals filed at 290 medium-sized and large German enterprises (including Opel and VW enterprises in Germany) amounted to € 1.49 billion;

b) the total number of innovative proposals filed reached 1.4 million;

c) the average economic impact per proposal was € 1,064;

d) the total number of employees at the enterprises which participated in the review was about 2 million people;

e) the average economic impact per employee was € 684;

f) on the average, innovators who filed at least one proposal accounted for 25% of the total number of employees;

g) the average number of proposals per employee came close to 0.72;

h) the average number of proposals per innovator per year reached, at least at some enterprises, 17(!);

i) proportional segmented extrapolation to 5,000 similar German enterprises shows that the overall economic impact of innovative proposals filed in 2007 may have been as high as € 27 billion;

j) industrial and non-industrial innovations accounted for 71% and 29% of the aggregate economic impact, respectively.

Conclusions

1. Due to the high aggregate economic impact of "mass-scale" innovations, the first thing that we need to do is implement *mass-scale training in MTRIZ foundations*, and thereby assure direct and rapid application of MTRIZ to increase the quality and efficiency of such "mass-scale" innovations.

Indeed, MTRIZ methods help to increase the efficiency of mass-scale innovative activity at individual enterprises *without long-term special training.*

2. MTRIZ technologies enable a detailed scrutiny of outstanding innovations and their creation stories, which in turn makes it possible to develop, based on the information obtained during such scrutiny, highly efficient training examples, and incorporate such examples into the training curricula for mass-scale education of industrial workers.

Naturally, selection and education of elite innovators is a critically important separate task. However, the elite will emerge as a result of such mass-scale education giving rise to a mass-scale innovative movement. To that end, we will be reviewing technologies for ongoing training of innovators on the basis of application of MTRIZ models to assure effective accumulation and transfer of experience generated by outstanding innovators.

11.3 Inventive Ideas Pool

This is a good place to explain *what exactly*, out of the entire body of expertise created by innovators, is popularized at large enterprises, *how* it is done, and *what* is the scope of managerial activity in terms of dissemination of best practices and training of innovators.

The answer will not be very long: information circulated about new achievements is restricted to descriptions of the *technical nature of proposals.* And that is all.

> **Knowledge about objectively existing models which were used to create an outstanding creative solution remains undisclosed!**

Have a look at fig. 11.4 (this is another version of the familiar fig. 3.12).

We postulate – and there are sufficient grounds for that – that the process of creating a major idea is the unity of three "sub-processes" related simultaneously to different "creative" (and different "systemic") levels of thinking, and to different "noospheres" of the *object of thinking* (artifact) and the *subject (organ) of thinking* (brain, personality).

That is why if we restrict our review to technical description of the innovation, we objectively remain at the level of applied knowledge. And that says it all. Let us recall Goethe[144]:

to place oneself at the level of the objects is to learn;
to take objects in their depth is to invent.

[144] Johann Wolfgang von Goethe (1749-1832) – outstanding German thinker, poet, philosopher and naturalist