Application of S.I.T. Method in "REGBA" Kitchens Production Plant

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Summary:
This article reviews the actual application of the **S.I.T**. method to solve technological problems as presented during a **Structured Inventive Thinking** course held at Moshav Shitufi (collective settlement) **Regba - ISRAEL** , and initiated by the author of this article.

A technological problem was presented to course participants and they solved it by applying the **Structured Inventive Thinking** method. Meticulous application of the solution at the **Regba Kitchens** production plant was a complete success, and lead to the development of a new, up-to-the-minute line of products similar to the original product. This has enabled the company to expand its product range. The case involved a new style of door, known as **Tavor,** that is suitable for kitchen cabinets. The new **Tavor** door, on display at **Regba Kitchens** stores, has generated great interest among the customers.

S.I.T. Method:

In contrast to other creative thinking techniques, **Structured Inventive Thinking (S.I.T.)** is organized in a series of stages that enable the problem-solver to focus on the limitations. The nature of the limitations undertaken by the problem-solver ensures that if a solution based on this method is found, it will be an **inventive solution** , that will not only be interesting and original, but will also represent a genuine and effective breakthrough.

S.I.T. uses thinking tools that were developed following careful analysis of 500,000 inventions and patents and a search for inventive thinking patterns. This method is recognized by the academic world (Tel Aviv University, The Hebrew University, The Weizman Institute) and is backed up by two doctoral theses in the area of creative thinking (Dr. Yanko Goldenberg and Dr. Roni Horowitz). During recent years, hundreds of courses and workshops on topics such as Technological Problem Solving, Advertising, Marketing, and New Product Development, have taken place in Israel and abroad.
Refer to additional information and discussion of the **S.I.T.** method at this conference [1, 2].

The accepted approaches of the Inventive Solution according to the **S.I.T.** method are:

1. **Subjective Approach**: the Inventive Solution is simple, original, elegant, surprising and interesting.
2. **Content Specialist Approach**: the Inventive Solution is regarded as inventive by the relevant content specialists.

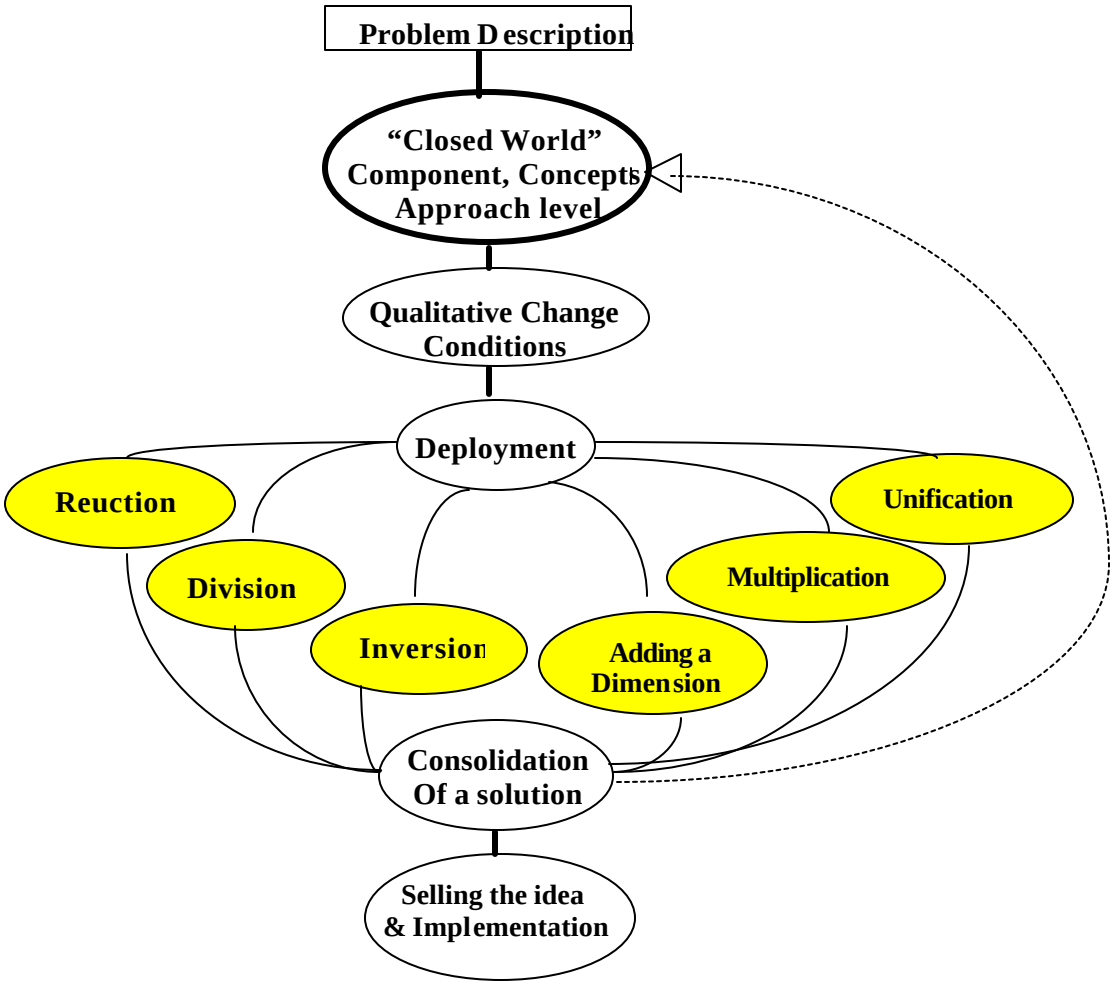
Stages of the Structured Inventive Thinking Method:

1. **Description of the Problem** – includes fielding free associative ideas for its solution.
2. **The "Closed World" of the Problem** – defines the current status and can be sub-divided as follows:
   - **Component List** – system components, environmental components.

- **Technological Concept** – understanding the existing underlying concepts of the system.
- **Qualitative Analysis** – analyzing which of the technological concepts should be retained.
- **Functions Chart** – serves as a tool to help internalize the underlying concept and the functional correlation between the components.
- **Discussion Levels** – differentiating between macro, micro, functionality, supplementary, etc.

3. **Conditions for Qualitative (or Significant) Change** – this condition forces us to search for an inventive solution by presenting a structured conflict.
4. **Exposition** – implementation of thinking tools such as unification, multiplication, inversion, addition of new dimension, division, reduction.
5. **Selecting an Idea** – selecting, elaborating and processing an idea until it takes the form of a practical solution.
6. **Solution Review** – if the solution is unsatisfactory, the **S.I.T.** process requires the problem-solver to return to the Underlying Technological Concept stage to assess the option of redefining the concept. Once a different approach has been defined, the process will be renewed starting at stage 3 – Qualitative Change.
7. **"Selling" the Idea** – promoting and implementing the idea.

Chart 1: Implementation -Stages of the Method S.I.T. (Structured Inventive Thinking)



Emergence of the Tavor Model

Personnel at the **Regba Kitchens** production plant were developing an idea for a new style of cabinet door. For some time, David Mittler, the Design and Development Department Manager, had been considering the idea of a curved kitchen cabinet door. The new door consists of a wooden frame containing an arched panel made from HPL (High Presure Laminate-"Formica") covering multiple layers of plywood. In Israel, this new style of door is known by the name **Tavor** based on the shape of the panel (**Tavor** mountain near **Nazareth**).

The **Tavor** door model (Pic-1,Pic-2) was displayed at the **Rehitim 1998** furniture exhibition in Tel Aviv where it was awarded 2nd prize in the **Design Product** competition sponsored by the **Furniture Manufacturers' Association**. According to customer feedback, the new arched door conveys a feeling of warmth.

Pic-1: **Tavor cabinet door model**

The bending or molding of the panel encased in the wooden frame allowed **Regba Kitchens** to break away from the traditional flat style of door. This new door style is distinctive because of its innovative design together with the added benefit that it is both stronger and lighter in weight than the traditional cabinet door. The combination of wood and HPL in the **Tavor** doors allows customers to purchase kitchen cabinets at a relatively low price while still enjoying the warmth and natural look of the wood.

Pic-2: **Tavor cabinet door - inside look**

Based on customer response to the new style of door, management at **Regba Kitchens** realized that they would be well-advised to incorporate this concept into the company's product range. The R & D team at **Regba Kitchens** began planning the production process for **Tavor** cabinet doors.

Problem Description

The panel production procedure includes use of a press to glue together a number of layers (a sheet of HPL glued onto each side of multiple layers of plywood) in a process which, despite vast knowledge and experience in the timber industry acquired by **Regba Kitchens**, is not as simple as it seems. After the panel has been glued together, a procedure lasting several hours, the arched section of the panel becomes strained as it tries to straighten itself. This lifts the adhesive, causing the panel layers to separate. It was evident that the gluing process was inadequate because only certain sections of the panel remained properly glued and withstood the test of time.

Another problem that arose concerned the radius of the arch which was not symmetrical. Different panel widths were required for every width of door but this was problematic as the designer insisted on identical arch height for all doors (Pic-3). Company management considered the option of bringing a timber engineering expert from **Germany** to help solve the problem.

Pic-3: **identical arch height for all doors**

Problem Solving Procedure

A problem-solving team was set up within the framework of an advanced course in S.I.T. run by **Tafnit** and presented by Dr. Yanko Goldenberg at Moshav Shitufi **Regba**. The team members were David Mittler, Mickey Yaakobi and the author of this article.

Careful study of the situation indicated that the problem of inconsistent gluing quality was caused by the glue press used by **Regba Kitchens**. This press was built to press sheets and flat surfaces, not to mold arches.

It was obvious that the arched surface had to be created by applying pressure at a central point. Consequently, the focus became how to do this using facilities readily available at the production plant.

In **S.I.T.** terms, we are seeking to solve the problem at the **closed world** level. In other words, the search for a solution must be within the framework of the limitations, the components and the **technological concept** of the existing system. No additional elements can be included. When a solution is found at the **closed world** level, it is reasonable to assume that it will be an **inventive solution** in accordance with the characteristics set down for a solution of this type.

The team followed the **S.I.T.** solution stages outlined in the introduction of this article. At the problem definition stage, the problem-solvers were required to focus on the existing correlation between two elements in the system. The correlation itself was the source of the problem. In fact, we were defining a contradictory situation, i.e. a situation where, in order to provide a solution we needed to meet two requirements that were incompatible. This situation is defined below in a qualitative graph.

In this graph:

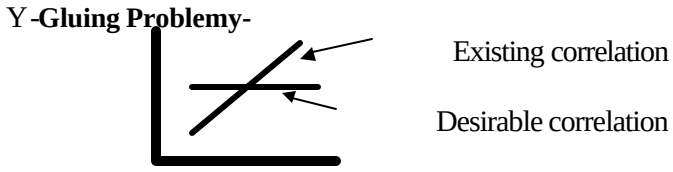
Y axis – represents the most problematic or disruptive feature, or the feature that escalates the problem if the feature increased, or would increase the chance of escalating the problem.

X axis – represents an important feature in the system that directly affects the generation of the problematic or disruptive feature.

The team drew up a number of graphs to aid them in their effort to identify the core of the problem. See the graphic representation below:

Graph of Qualitative (Significant) Changes in the Correlation

Chart 2: Change in essential correlation



The graph of the **existing correlation** represents the nature of the problem, in terms of the existing correlation between the variables.

The graph of the **desirable correlation** represents the intellectual limitation in terms of the objective we wish to achieve.

We are searching for a solution that will generate a qualitative (significant) change in the correlation between the variables.

In order to overcome the contradiction and to generate ideas for a solution, the team will apply the **multiplication** thinking tool twice.

This thinking tool is used to identify the system component that when multiplied, and changes are made to several of its characteristics, it would implement the action that would generate the change that we are seeking in the correlation.

This thinking tool overcomes **quantitative fixation**. We tend to view the existing system components as permanent. **Multiplication** allows us to imagine what will occur when the number of components increases.

First **multiplication** – We added some wooden boards (plywood) to the upper section of the press. In principle, the structure of these boards is identical to that of the door panel we need to bend into shape. The wooden boards were constructed in a similar manner to a leaf spring.

Each board has a different width and while they sit one on top of the other, they are not glued together (Pic-4). Application of pressure at a central point creates a symmetrically shaped arch. This arch will exert a uniform level of pressure on the entire panel width and the glue will spread as required. a leaf spring was constructed for all existing panel widths.

Pic-4 **The new press -upper section of the press - leaf spring**

Second **multiplication** – We added strips of wood ("leist") of different heights to the lower section of the press and these were glued to the board at certain exact points, thus the appropriate radius was formed during the gluing and strengthening process. A mold with appropriately placed wood strips was made for each panel width.

Because the "problem owner" was involved in searching for the solution, it took less than two weeks to alter the Development Department press in order to assess the idea in practice. After the gluing quality successfully passed the acceptance tests, it was found that the new press had reduced the time required for the gluing process by half. The new door model was displayed in **Regba Kitchens'** factory store and as mentioned above was given the name **Tavor**.

At the production plant, planning and building of a new industrial press for mass production began. Surprisingly enough, the **multiplication** thinking tool was also applied in this case. A long press was built, consisting of three units of the basic press built in the Development Department (multiplication). This long press (Pic-5) can glue three panels of differing dimensions at the same time, or it can glue one long panel of up to 2.5 meters for the door of a bedroom closet (wardrobe). This industrial press is now used to produce **Tavor** doors of the highest quality in order to meet orders received by the company.

Pic-5 **The new press**

Additional advantages offered by the new press relate primarily to increased production flexibility for multi-layered arched models and components. At the production plant, and in the timber industry in general, it was, until very recently, customary to build a special mold for every arched component and for every different arch width or radius.

This new press facilitates the easy and minimal-cost production of arched components of differing dimensions and arch radius. This flexibility allows the production plant to manufacture new models at lower cost and in a shorter time-frame. Furthermore, the new press has significantly improved the quality of the gluing process.

In **S.I.T.** terms, this would be an **inventive solution** which is not only interesting, elegant and original but also represents a genuine and effective break-through.

Harnessing Technological Success to Benefit Marketing

The appropriate concept in such circumstances is:

"When innovation presents itself, go along with it for some time and reap the fruits that it bears even if this was not planned in advance."

In other words – Never sit back on the laurels of success.

Although the production plant Design and Development Manager and the author of this article were satisfied with the relatively short time it took to turn the general idea into a viable technical solution, a graduate of a basic **S.I.T.** course who works in the Design and Development Department suggested using the successful technique of the new press to create

a new door model. The new door, similar to the most prevalent door model – **Multi Color** – is arched (Pic-6), along similar lines to the **Tavor** model, but does not have a wooden frame. The door is made from 6 layers of flexible plywood and has a layer of HPL

or Veneer ("Furnier") glued to either side.

The new arched door – Tavor Multi-Color – is actually only slightly lighter than a regular door, but in our opinion, the aesthetic considerations of the market indicate that there is room to develop a new fashion line of doors for kitchen cabinets and wardrobe (bedroom closet).

Pic-6**: Multi Color Tavor model**

Another idea that would utilize the technological success was raised recently by the design and development team and is currently being implemented. An additional model, **Tavor-Glass**, is in production (Pic-7). This model is similar to **Tavor**, but its panel is made from decorated arched glass instead of HPL. The production plant produces the wooden frame parts (the same as those used for the Tavor model) and purchases the arched glass in the appropriate dimensions.

Pic-7**: Glass Tavor model**

In the opinion of the author of this article, the technological advantage of the new press should be converted into a business opportunity. Competitors, particularly small carpentry firms, are incapable of producing similar models. It is therefore important that the company turns this situation into an advantage. The next move should be an aggressive advertising and marketing campaign to promote this innovative technology by focussing on the **Tavor** model in particular, and on other products in general. Innovation conveys a hidden message about quality and this will enhance the marketing impact significantly thus increasing sales and income as well as demonstrating the advantage **Regba Kitchens** has over its competitors.

Conclusion

It is customary to associate the ability to introduce new concepts into a business organization with three main elements:

1. The thinking habits of the individual.
2. The thinking habits of the group.
3. The ability of the organization to administer the innovation and to implement it quickly and efficiently.

This article describes a real case where the **S.I.T.** method was applied in order to find a solution that integrates all the elements in order to solve technological problems. In our opinion, the most effective way to turn change and innovation into second nature for the people in the organization, once they have acquired the new thinking tools, is by allowing them to solve real problems within the organization. Furthermore, there should be a high level of management involvement in the solution processes for problems relating to innovation.

It seems that involvement of the "problem owner" and other top professionals in solving the organization's problems greatly increases the chances of finding inventive solutions according to the **S.I.T.** method.

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