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TRIZ ROADMAP FOR IDENTIFYING ADJACENT MARKETS

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Abstract

Entering adjacent markets is a well-recognized and effective way of expanding a business without its dramatic transformation. Therefore, the identification of adjacent markets is a very popular service from TRIZ consultants. Modern TRIZ recommends using the Reversed Function-Oriented Search (RFOS) as a major tool for identifying adjacent markets for existing products. In practice, however, using RFOS is not always particularly straightforward, because (1) it is often necessary to find new markets / applications for technology and equipment involved in the production of a product, rather than for an existing product, and (2) the product itself may not be a separate product intended for the end user, but a component for some other product. However, RFOS is not the only useful TRIZ tool that can be used to identify new markets for existing products and technologies. Based on their practical experience in TRIZ consulting, the authors have developed a roadmap for identifying adjacent markets, which includes the analysis of Main Parameters of Value, Voice of the Product, screening based on the Quantum-Economic Analysis (QEA-screening) and other TRIZ tools, in addition to RFOS. The roadmap is applicable for all kind of products as well as for technologies involved in their production. Four brief case studies are presented to illustrate the use of the roadmap.

Keywords: *adjacent markets, Adjacent Markets Identification (AMI), Main Parameters of Value (MPV), MPV analysis, QEA-screening, Reversed Function-Oriented Search (RFOS), Voice of the Product (VOP)*

1 Introduction

Entering adjacent markets is a widely accepted marketing strategy for developing business without venturing too far from the core competence of the company [1, 2]. Therefore, the demand for the services of TRIZ consultants in Adjacent Markets Identification (AMI) is growing rapidly.

In the marketing literature, however, it is difficult to find specific recommendations or a sufficiently detailed algorithm for identifying the adjacent markets. For example, VisionEdge Marketing [3] recommends performing the following steps:

1. List adjacent markets you are already serving.
2. List adjacencies your organization has previously considered or rejected.
3. Identify other existing adjacencies you know.
4. Consider what potential adjacencies might emerge due to a technology advancement.

These recommendations are too general to be instrumental and rely too much on the personal skills and experience of the implementer, which makes them difficult to use in practice and does not guarantee success.

TRIZ practitioners have developed more specific approaches to identify and address adjacent markets, but in most cases, this is associated with developing a new product to serve adjacent customers who are not served by the core product of the company. Frequently, TRIZ consultants suggest doing the following: (1) generate ideas for new products, and (2) see if these products can serve some adjacent markets. For instance, Ball et al. [4] recommend using Systematic Inventive Thinking (SIT) tools proposed by Boyd and Goldenberg [5] in order to generate ideas for new products and then to identify others who may need these new products, apart from existing customers.

This method is in fact a type of trial and error approach, which requires a good deal of time and labor, but does not guarantee that adjacent markets will be found. Additionally, most companies would prefer not to develop new products, but to enter adjacent markets with their existing product and assets.

This demand is partially addressed by GEN TRIZ methodology for AMI [6,7] that represents a Reversed Function-Oriented Search (RFOS) [8]. RFOS generally includes the following main steps:

1. Select an object for RFOS, which could be the entire product/technology or one of its components.
2. Formulate all properties of the object (physical, chemical, geometrical, etc.) and select one of the properties.
3. Convert the selected property to a set of functions and select one of the functions.
4. Generalize the selected function and identify a leading area in which similar functions and properties are very important and that has the biggest business potential.
5. Identify in the selected area a specific function similar to the generalized function and use the identified function as a new main function of the initial object.
6. Identify and solve adaptation problems to make the object perform the new main function.

Although RFOS does provide a systematic approach to identifying adjacent markets, its application is not always straightforward.

First, the leading areas that RFOS suggests to identify at Stage 4 (see step 4 in the list above) are not defined for the case when AMI is performed for a consumer product. The term "leading areas" used in RFOS came from classical Function-Oriented Search (FOS) introduced by Litvin [9], which is designed for industry and science, and is hardly applicable to the consumer market.

This means that RFOS can only be applied to AMI for business-to-business (B2B) products, but even in this case it does not give specific recommendations on selecting the leading areas, nor on assessing which of the leading areas offer maximum business potential to the client. In practice, this results in considering more leading areas than necessary, spending extra time and resources.

Second, RFOS does not provide specific recommendations on how to select one of the properties of the object for RFOS to convert it to a set of functions, which often results in the necessity to repeat the entire procedure several times in order to consider several different properties.

Finally, RFOS does not specify how to convert the properties of the objects into functions, which may be a difficult task, for example, if the object of RFOS is a chemical substance/ingredient.

In a recent conference paper [10], the authors have summarized their experience in identifying adjacent markets for different clients and devised an RFOS-based roadmap for AMI that is easier to use than the original RFOS [8].

In this paper, the authors describe this roadmap in more detail. The focus of the paper is shown below on the Innovation Ambition Matrix [1], see Fig. 1.

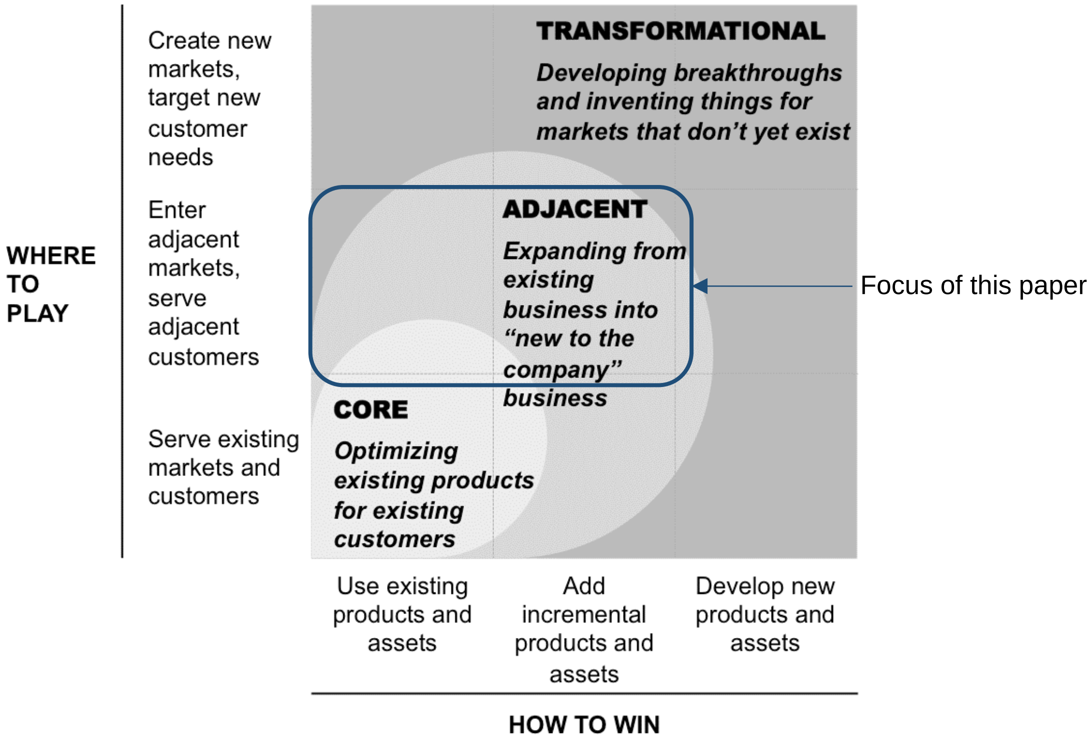

Fig. 1. Innovation Ambition Matrix [1] and the focus of this paper

As can be seen from Fig. 1, the paper mainly covers the identification of those adjacent markets into which you can enter with existing products and assets (such as technology and equipment) or with only incremental modification of existing products and assets.

MBA Knowledge Base [1] indicates that resources are very unevenly allocated for different types of innovations, and their returns dramatically differ depending on innovation type (see Fig. 2).

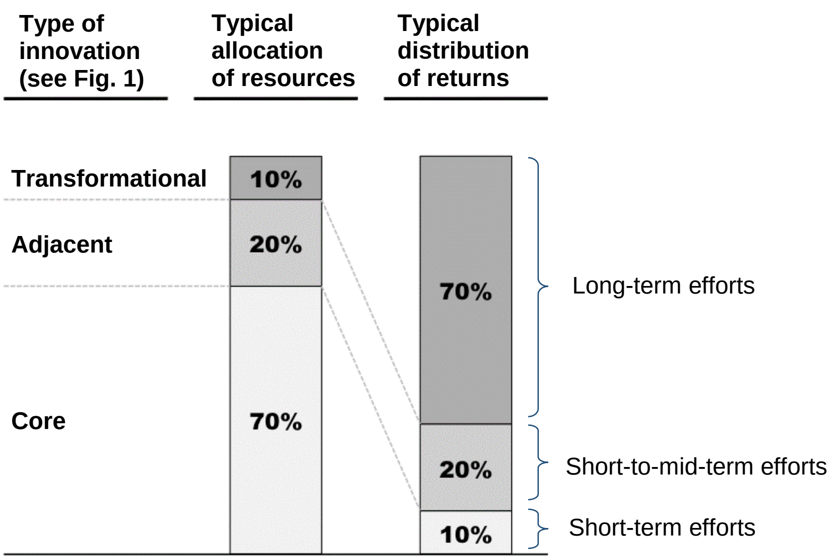

Fig. 2. Typical allocation of resources and distribution of returns for different types of innovations [1]

As shown in Fig. 2, "adjacent innovations" that include entering adjacent markets yield, on average, a decent 20% of the company's total innovation portfolio returns while expending 20%

of the resources allocated for the portfolio. This is a very good result compared to innovations aimed at improving the core product, which usually consume 70% of resources while yielding only 10% of returns.

At the same time, adjacent innovations typically provide their returns in short-to-mid-term, which is almost as fast as core innovations aimed at optimizing existing products. This explains why identifying adjacent markets is one of the most frequent requests in TRIZ consulting practice.

Although it might seem that transformational innovations consuming on average only about 10% of resources while generating 70% of returns (see Fig. 2) are much better than other types of innovations, these innovations are usually very risky and normally yield returns only in the long-term, which is often unacceptable to business.

2 Method: TRIZ tools utilized

In order to make the roadmap for AMI as specific as possible, we used existing tools of modern TRIZ in order to enhance RFOS. These tools are:

- Main Parameters of Value (MPV) analysis, as summarized by Litvin [11], which helps to identify “leading areas” (that is leading demands) of the consumer market. This includes the approach for identifying latent customer needs described by Ikovenko [12].
- Voice of the product (VOP), as described by Abramov [13], that identifies the most promising MPVs (properties and functions) that the product may offer to consumers, including the product’s latent MPV, as shown by Abramov [14].
- Screening tool utilizing Quantum Economic Analysis (QEA), introduced by Abramov et al. [15-16] (further in this paper referred to as QEA-screening). This tool identifies leading areas that are unpromising for the client’s business, and should be rejected.

3 Results: suggested roadmap for AMI

The resulting roadmap that the authors suggest for AMI projects is shown in Fig. 3.

It should be noted that this roadmap assumes that the object for which it is necessary to find adjacent markets has already been selected, which is, in fact, almost always the case in the practice of TRIZ consulting.

Indeed, the roadmap in Fig. 3 does not cover all cases when it is necessary to utilize adjacent markets. For example, it does not include the use of, as suggested by Hagel et al. [19], assets available on adjacent markets, e.g., Uber’s use of automobiles that are owned by others.

The authors, however, have successfully applied all parts of this roadmap in several actual AMI projects. The highlights of four projects are given in the brief cases studies below.

Step 1: Identify whether the Object for AMI (further – Object) is
1. Intended for business or for a consumer (**B2B or B2C product**)
2. **A finished product or a component/material/ingredient** for some other product

Step 2: Use product-oriented MPV analysis [13] to **identify all appropriate properties of the Object and related assets** (technologies and equipment) that are used to produce the Object:
- For a **finished product** – its **technical parameters** (performance, etc.)
- For a **component or material** – its **physical properties** [17]
- For an **ingredient** (sometimes for a material too) – its **chemical properties** [18]; if needed – **biological properties** (e.g. microbial properties), etc.
- For the **assets** – **their technical parameters, materials** that the assets can process and **operations** that the assets can perform with the materials

Step 3: If applicable, **convert these properties into a set of functions** as in the original RFOS [8]; otherwise, keep the properties unconverted

Step 4: Identify VOP [13, 14] for the Object and related assets; **reject all functions and properties that do not meet the VOP**

Step 5: Generalize remaining functions and properties as in the original FOS [9]

Step 6: Find **where these functions and/or properties are needed** most of all:
- For **B2B products -** identify **the leading areas of industry and science** for which these features are critical - just like in the original RFOS [8]
- For **B2C products -** use MPV analysis [11-13] in order to find **"leading groups of consumers"**, including latent ones, that need these features most of all

Step 7: Identify specific applications or products that may utilize these functions and/or properties:
- For **B2B products** – identify such applications or products **in the leading areas of industry** identified in Step 6
- For **B2C products** – identify **existing or new products** with these features that the **"leading groups of consumers" identified in Step 6** will appreciate

Step 8: Reject those applications and products that
1. **Cannot be addressed without serious modification of the assets** that are currently used for producing the Object, and
2. **Do not pass QEA-screening** [15-16], and, therefore, are unpromising for the client in terms of business potential

Step 9: If necessary, **identify and solve adaptation problems** for the remaining applications and products as in the original RFOS [8]

Fig. 3. TRIZ roadmap for identifying adjacent markets

4 Case studies

The overview of the four case studies presented in this paper is shown in Fig. 3.

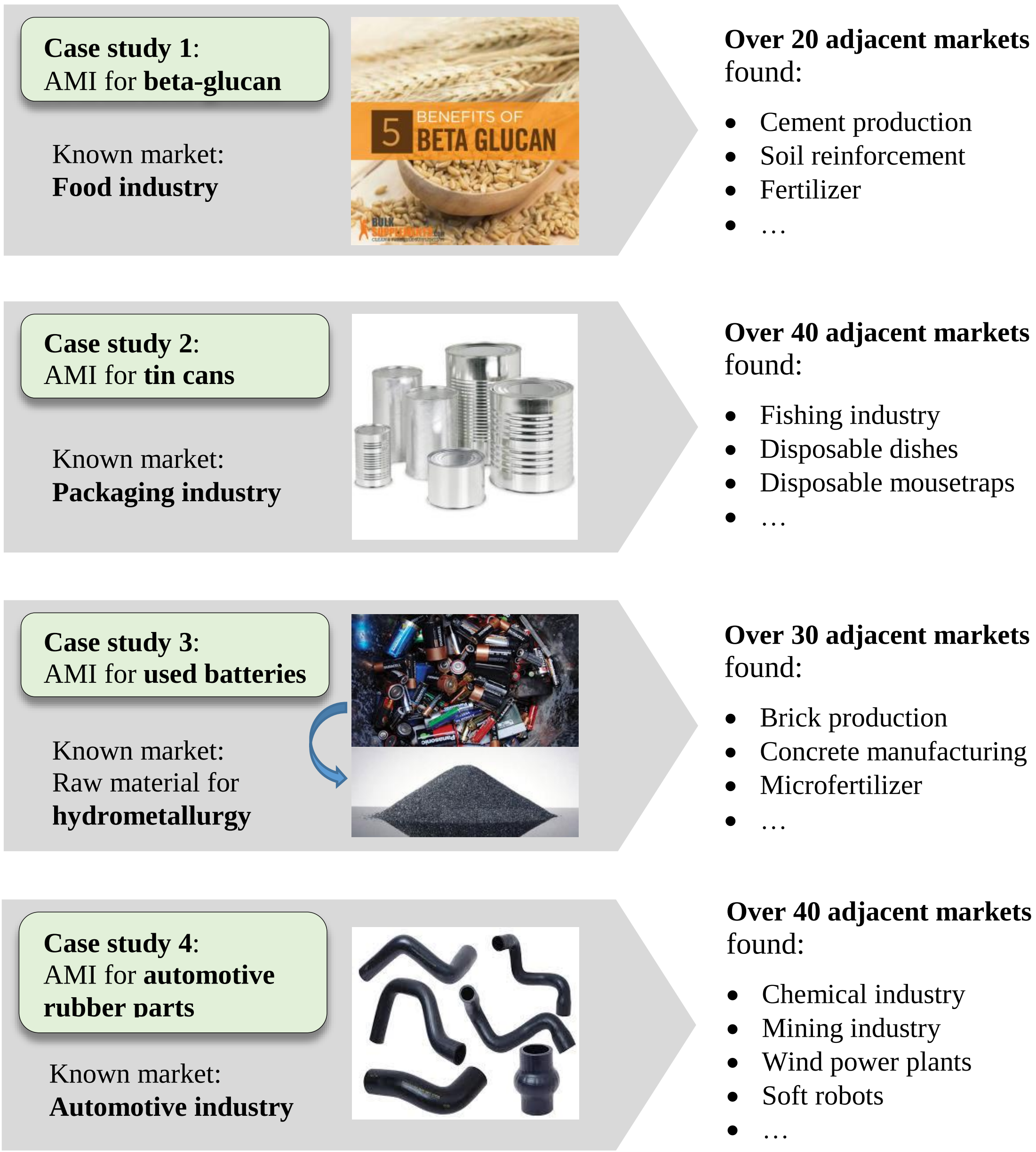

Fig. 4. Case studies at a glance

Some details of each case study shown in Fig. 4 are provided below.

4.1 Case study 1: AMI for beta-glucan

In this project, the client was a medium-sized company producing baking yeast. As a by-product, the company obtains beta-glucan, a biopolymer with high nutritional value, which is a popular food additive. However, the amount of beta-glucan produced by the company exceeded demand in the local food industry and, so, the company was looking for adjacent non-food markets for this by-product.

The product-oriented MPV analysis [14], which we performed at the molecular level, showed that beta-glucan molecules have, the following features:

- They are able to promote gelling, and
- They have an internal cavity in which they are able to trap and hold foreign molecules.

These features can be translated into generalized functions “to thicken” liquids, and “to absorb” liquid or gas.

Examples of leading areas that need these functions most are: the concrete industry, geo-engineering, and the pharmaceutical industry.

Therefore, the new applications for beta-glucan that we recommended to the client included:

- Using beta-glucan as a viscosity agent in concrete that allows improving important properties of concrete without adding more cement as confirmed by Nara et al. [20];
- Using beta-glucan as a soil-strengthening component that, when sprayed over the soil, makes the soil stronger, thereby preventing its erosion, as researched by Chang and Cho [21];
- Using beta-glucan in the pharmaceutical industry as a drag encapsulation agent that is able to efficiently hold and deliver molecules of medications into the human body as indicated by Venkatachalam et al. [22].

QEA-screening revealed that for a medium-sized company, which our client is, all three of these applications are promising in terms of commercialization potential, while a few other applications that we found (not mentioned here) are much less promising for the client’s business.

4.2 Case study 2: AMI for tin cans

The client in this case was a medium-sized producer of tin cans for the food and paint industries. Unfortunately, the local food and paint markets were not large enough, while the international market for tin cans was becoming more and more competitive, and therefore difficult for the client to penetrate and hold onto. For these reasons, the client wanted to discover adjacent markets for tin cans.

The product-oriented MPV analysis and the VOP [13, 14] for tin cans showed that

- Cans have some properties, for example, buoyancy, that are not utilized in their current application as a container for protecting products during storage and transportation;
- Consumers have latent MPVs that are not addressed by existing cans, for example, consumers would like the contents of the tin can not to stick to the can’s walls in order to use 100% of the product. Currently, large amounts of the contents (especially paint) remain on the can’s walls.

These two properties can be converted into the following generalized functions: “to float in the liquid” and “to repel substances,” respectively.

One of the leading areas for floating objects is the fishing industry, where large amount of floats are used for fishing nets; the leading area for anti-stick cans is the paint industry, which the client currently underserves with its existing cans.

Based on this, among the over 40 new applications for tin cans that we recommended to the client were:

- Using tin cans as floats for fishing nets (adjacent market is fishing net industry), and

- Making oleophobic cans, for example, by treating them with an omniphobic coating by UltraTech [23]. This may allow the client to win a good piece of the paint market currently served by competitors.

QEA-screening revealed that for a medium-sized company both of these applications are promising in short to mid-term prospective.

4.3 Case study 3: AMI for used batteries

We performed this project for a large company that produces zinc-carbon battery cells for portable electronics. In order to protect the environment, the company accepts used batteries and, after crushing these batteries, obtains a black powder containing a mixture of carbon and metal oxides particles (mostly zinc and manganese oxides). Then, the company just stores the powder in special warehouses. There are two reasons for this: 1) the government forbids disposing the powder into the enivironment and 2) there are no known methods for recovering valuable metals (zinc and manganese) from the powder that are economically feasible. So, the company was looking for useful applications for the black powder as it is or for its components that can be separated without involving expensive technologies.

Examples of the black powder properties revealed by our MPV analysis are:

- Black color, and
- Electric conductivity.

We converted these properties into the following generalized functions: "to make black" and "to conduct electric current", respectively.

These functions are needed in the following applications that we recommended to the client:

- Using in the manufacture of black bricks as suggested by Hyong Hag Im [24], in which black powder is used as a coloring agent for clay bricks, and
- Using black powder as a conductive additive for different materials.

QEA-screening revealed that for a medium-sized company these applications are promising in short to mid-term prospective.

4.4 Case study 4: AMI for automotive rubber parts

In this project, the client was a medium-sized company that produces different types of molded and extruded rubber parts for the automotive industry: hoses, bellow, seals, gaskets, etc. The local market for these parts had become saturated and the company wanted to identify adjacent markets and the products for these markets that it could produce using its existing assets, which included technologies and equipment for molding and extruding items out of different elastomer compounds.

Our MPV analysis showed that elastomers have some properties that the products currently produced by the client did not utilize, for instance:

- High dielectric strength;
- High thermal conductivity;
- High damping ability, etc.

We converted these properties into the following generalized functions: "to stop electric current", "to conduct heat" and to "absorb shock and vibration", respectively.

These functions are critical for the following applications/products, among numerous other new applications that we had found, that we recommended to the client:

- Various insulators for medium- and high-voltage electrical grids;
- Heat conductive pads for electronic components, such as processors, power transistors;
- Vibration dampers for wind turbines, etc.

QEA-screening revealed that these applications are promising for the client in short to mid-term prospective, while some of the other new applications that we had found were not so promising for a medium-sized company like our client.

5 Conclusions

This paper describes research in progress and, so, the roadmap for identifying adjacent markets presented here, although it was very useful in actual TRIZ-consulting projects performed by the authors, cannot be considered as a universal roadmap that works equally well in all practical cases.

The roadmap does, however, cover the most frequent practical cases when the client wants to introduce its current product to adjacent markets or to use its existing assets to serve these markets.

As compared to the original RFOS [6], the proposed roadmap provides

1. Much more specific and detailed recommendations for most steps, which saves time and resources in the project;
2. Higher value results because it rejects unpromising products/applications for adjacent markets that either do not meet VOP or are unlikely to be commercialized by the client.

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