

Optimal company's structure for stable and competitive development

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Abstract: Sustainability of any organization hinges on its main function: outputs it can offer to the market. This sustainability is defined through quantitative parameters linking the basic function of the organization with its supplementary function. At optimal equilibrium, 62% of all expenses is allocated to the former and 38% to the latter (following the 'golden ratio'). The supplementary function comprises research and development (R&D), marketing and other expenses crucial for innovation and competitiveness of the organization. The resulting flexibility allows the organization to redesign all business processes and adapt to the volatile competitive environment while retaining its creative potential.

Keywords: competitive advantage, golden ratio, innovation, O-ring theory, self-similarity, slack resources.

1. INTRODUCTION

Modern management theory was given large impetus by Adizes methodology. The main values underlying this model are effectiveness and efficiency. Effectiveness is defined as "obtaining results which somebody needs", and efficiency is defined as "conducting activities with minimal waste". However, both effectiveness and efficiency cannot be optimized simultaneously. Nevertheless, company's managers need quantitative tools to be able to chart strategy. Unfortunately, these tools are in short supply. Most of the literature on this model dealt with finding balance between these values, and resulting recommendations are to large extent qualitative.

In the Adizes framework, Producing is the activity of attaining short term or immediate results, and Administrating is the activity of minimizing waste in ongoing activities. Entrepreneuring is the activity of seeking out and recognizing new opportunities or new orientations to the environment, and Integrating is the activity of coordinating shared attention and identification. Integration keeps organizations socially and functionally cohesive, preventing them from degenerating into mechanical, purely formally interrelated collections of functionally isolated individuals.

However, Adizes also introduced temporal dimension that is orthogonal to effectiveness/efficiency dimension. Decisions that are effective in short-term often are detrimental to organizations in long-term. Thus, taking large loans (taking in account the size of the company) can be effective in short term but can bring worsening financial situation in a company in long term. Taking shortcuts can be efficient in short-term, but result in quality deterioration, reputation damage and lost market share in long term.

Consider any production process, either within a firm or the economy. Efficiency in short-term requires optimization of administrating procedures. Every step on the way toward increasing output at lesser per-unit cost is an improvement. Why to disrupt this system? It shouldn't be changed, because it is inefficient and makes the entire company less efficient. On the other side, all business processes in short-term are backward-looking and require tools and processes that already are used.

Long-term development requires creation products or services that people will need in the future. This requires entrepreneurship that delivers such products. However, entrepreneurship is never efficient: there are not yet new products, but it needs resources that should be diverted from production. Moreover, it requires slack, i.e. idle resources that are not used.

Entrepreneurship concentrates on designing something that doesn't yet exist, but the first attempt is rather outrageously wasteful. However, if it succeeds, new value is created.

In management practice a company should utilize methods that already work and to make them run faster and with less waste. In every production process every step toward increasing output at smaller costs improves bottom line and increases efficiency. Thus, since the company's goal is to boost profits, it has to concentrate on it. But reasoning is wrong. Oftentimes organizations are so preoccupied with profits that they go bankrupt.

Why? If a company focuses on profits, shouldn't it generate profits? No. That reasoning confuses input with output. Profit is like love, health, and happiness. If you focus on happiness and say, "I must be happy today," you may become quite miserable. If you say, "I must be healthy," you may become a hypochondriac. And to say "There must be love" can create a great deal of hate. The right question is what makes you happy, healthy, or feel that you are in love. That should be your focus. Focus on the inputs in the direction of the output. If you focus on the output and ignore the input, you create expectations that might not be realizable. Thus, the company that wants to succeed should focus on input [1]. In practice, it means optimization of input, i.e. expenses.

But company's resources are limited. How much can be devoted to entrepreneurship? This is the question the management is likely to ask. We have to answer this question in detail.

There are five recurrent factors that influence corporate entrepreneurship [9]. The first element is management support, i.e. the willingness of senior managers to support and promote entrepreneurial ideas. The second factor is the use of rewards and reinforcement. The third factor includes autonomy and discretion, i.e. creation of an environment that enables employees to promote entrepreneurial projects. Time availability and its related resources form the fourth factor. Innovative activities require that employees perceive the availability of slack resources so that they can focus on entrepreneurial activity. Finally, the fifth element is organizational boundaries. Employees must perceive that the structures and processes in their organization do not obstruct idea implementation.

Factors that promote entrepreneurship also stimulate integration. The first, second, third and fifth factors are directly related to development and stimulation of integration, whereas the fourth factor requires additional resources and corresponding slack. Thus, we first will consider slack in organizations, and then turn to questions related to integration.

2. INNOVATION AND SLACK RESOURCES

In an increasingly competitive world, businesses are forced to innovate continuously. Innovation relies on the availability of resources defined as slack [3]. Slack resources include excess inputs such as redundant employees, underutilized capacities, and uncommitted capital expenditures. They also include unexploited opportunities to increase outputs, such as increases in the margins and revenues that might be derived from customers, as well as innovations pushing a firm to the technology frontiers.

On the other hand, organizational slack has come under sharp scrutiny as organizations facing intense global competition feel pressured to eliminate all forms of slack, becoming "lean". These two countervailing forces suggest a potential paradox: if slack is a form of inefficiency but also essential for innovation, organizations run the risk of eliminating slack to a point that undermines their capacity to innovate.

Too little slack is averse to innovation as it discourages any kind of experimentation where success is uncertain. By the same token, too much slack discourages innovation as it breeds complacency and a lack of discipline, creating a situation where more bad projects might be pursued than good ones. Put together, these arguments suggest that the relationship between slack and innovation should be viewed as having an inverse U-shape.

The goal, then, is to locate an optimal amount of slack that maximizes innovation. Slack resources are related to operating expenses, and their optimization follows from an optimal distribution of expenses.

Therefore, optimization of resource distribution under the entrepreneur's control determines the firm's viability. We may now turn to finding specific parameters that define this viability.

3. INTEGRATION AND THE O-RING THEORY

Promotion of entrepreneurial ideas requires management capable of appreciate them. This is directly linked to integration of different levels (managerial, research and development, production workers etc.) in entrepreneurial firms. Emergence of competitive entrepreneurial firms. However, this conclusion requires that firm managements are always equally qualified to verify the different professionals' abilities. According to the O-Ring theory, successful production requires the coordination of typically, complex and human capital-intensive- tasks and cooperation within the team. Given this production environment, the verification of the team members' abilities will plausibly be enhanced if the evaluation is carried out by the team members themselves. Yet, even if verification is in principle possible, it is necessary to provide incentives to specialize on this task. In entrepreneurial firms the motivation to select appropriately is directly linked to the manager-owners' residual income claims. In contrast, wage-incentives for specialized human resource managers in large corporations cannot draw on direct measures of their recruitment success. Moreover, organizing the team not only requires selective recruiting. It will also be necessary to dismiss individuals who, upon being initially hired, turn out not to fit perfectly into the team. However, only large, well-diversified firms can be taken to satisfy the assumption of risk-neutrality. In such firms the possibility to implement a selective human resource policy is then additionally limited by their "corporate culture" and by law

If optimal performance of a company requires matching between high-performing workers, then the company must invest time and resources into finding such matches. This approach requires that certain amount of slack should remain, and that the distribution of resources should take into account such slack to achieve good matching. The O-ring theory [6] explains why this approach is a prerequisite to sustainable success.

Let us examine one brand of organizational theory, where a person's productivity level is seen as fully dependent on their colleagues [5]. This approach has been called "the weak link theory of production", where the productivity of an entire team depends on the talent and effort of the weakest member of the team. (The economist Michael Kremer calls it the "O-ring" theory of production, after the ring of rubber sealant whose failure caused the explosion of the Challenger Space Shuttle on take-off in 1986. A poignant reminder how vulnerable a state-of-the-art, multi-billion-dollar engineering masterpiece can be to the malfunctioning of the simplest component).

Assuming any team consists of a combination of gifted and ordinary people, and that one's abilities can be enhanced by suitable training, it makes sense to focus on the least capable person – the weakest link, one that downgrades the performance of the entire team. Indeed, throughout human society, promoting the disadvantaged appears to benefit everyone.

Now suppose people could choose their colleagues. Clearly, everyone would like to have talented colleagues; accordingly, a mechanism for 'doling out' such desirable people is needed. This mechanism might resemble an auction. Not literally – it might operate via the job market, or the housing market, in which people (or the companies that employ them) pay the premium for having talented colleagues or socio-economically successful neighbors. Those blessed with more talented workforce or greater business success will be willing to place a higher bid in this auction, as in turn their employees will be more productive working for them than for less talented bidders. Consequently, talented people are attracted to other talented people.

Let us now consider the effect of this on incentives to invest in making people more productive – through education or in-service training. It will still be true that, within a given working group, investment would be concentrated on the least talented (in view of the "weakest link" effect). Yet more talented groups will produce a higher return on investment than less talented groups, because each re-trainee will be working among more talented colleagues. The result is likely to look something like low-talent "slums", with low rates of investment and growth, and neighborhoods of high talent with high rates of investment and growth. This is reflected in the distribution of productivity across different companies.

Thus, integration at all levels depends on optimal matching between employees and on management that is capable of influence the corresponding factors: management support; the use of rewards and reinforcement; autonomy and discretion; and organizational boundaries.

A useful analogy is Internet bandwidth. Many people who installed broadband connections were disappointed to learn that their de-facto download speeds were a tiny fraction of the advertised hundreds of megabytes per second. Yet download speeds of each user are determined by the slowest connection between the source and destination computers. As a result, in a particular network, it makes sense to concentrate investment on the slowest connection. At the same time, a network with faster connections generates larger download rate gains per given investment. Thus, long-term investments should flow to development of networks with fastest connections. So, the same question arises: how to find optimal balance between short-term and long-term investments.

Such a question can be put in wider context: how much resources should be devoted to entrepreneurship and integration. To answer it we have to turn to the concept of self-similarity.

4. FRACTAL STRUCTURES AND SELF-SIMILARITY

Sustainability of competitive advantages is not to be taken for granted. It is determined by a variety of business strategies implemented by different organizations. As gains from these strategies do not self-perpetuate, organizations that fail to adapt are sure to wither. These gains are usually based on successful business structures and high entry barriers. A business structure can be based on products or services, diversified markets or optimized practices that determine successful functionality. Organizational structures must conform to development processes, innovation, planning, compensation schemes, employee training, and budgeting, all of which are mutually aligned, allowing the organization to implement defined strategies with minimal friction.

However, organizations that adhere to this model too tightly are still quite likely to fail, as these advantages can be easily reproduced by competitors within a short time. Indeed, “copycats” may even improve on these strategies. If advantages are not sustainable in the long run, company activities tend to dissipate or conflict among themselves, frictions increase and sap energy from the organization, with structural units working out of sync or even against one another. Too many companies end up with hierarchies that look like top-down pyramids.

There appears to be a general understanding that company structures must be based on structures found in nature [4]. Together, such structures are capable of forming fractal systems. Fractals are infinitely complex patterns that are self-similar across different scales. They are created by repeating a simple process over and over in an ongoing feedback loop. Firms that are organized similar to natural ecosystems evolve in a non-linear fashion. If fractals are outcomes of iterative self-organizing processes, then social organizations are characterized by non-linear temporal and spatial processes, where tensions are resolved [8].

The concept of fractal organizations has important implications how managers look at organizational structures. In ‘fractal’ firms, each subsystem level reflects the structure of a higher level, and fractal dynamics are preserved all the way down the organizational hierarchy. Parameters that describe these subsystems are reflected in the expense structures of subsystems and should replicate the same expense ratios as those found in the higher-level systems. In short, structures within such systems are characterized by self-similarity.

Self-similarity is one of the main properties of fractal systems – quite common in nature, less so in anthropogenic systems. In our case, temporal self-similarity is the most relevant. Self-similarity provides a sense of order in seemingly irregular structures. This property allows these systems to maintain their essence – relationships that constitute their identity – at all levels.

An important system concept closely related to self-similarity is that of redundancy, or slack. In communications theory, redundancy implies repetition or lack of independence between successive events [7]. The importance of this concept is underlined by the O-ring theory.

5. SELF-SIMILARITY AND OPTIMAL EQUILIBRIUM

Optimal distribution of expenses is instrumental to the successful functioning of a company. Successful companies, considered over the medium term, are characterized by balancing of long-term versus short-term expenses – i.e., optimized distribution of operating expenses (production and administration, research and development (R&D), up-to-date equipment, successful marketing etc.). Since proper balance determines the optimal growth of a company, there should be temporal self-similarity between the structure of these expenses over the medium and short term.

Temporal self-similarity can be defined as the pattern of behavior over the short term that resembles medium term behavior patterns. In the short term it corresponds to the ratio of expenses that determine success of a company in long term to expenses required for functioning of the company in short term. In other words, it is equal to the ratio of expenses linked to entrepreneurship and integration to production and administrative expenses during one year. Over the medium term, such ratio corresponds to production and administrative expenses over a number of years to total company expenditures over these years, which is in turn equal to the sum of production and administrative expenses and expenses linked to entrepreneurship and integration (OE). The corresponding formula is as follows:

$$\frac{EI}{PA} = \frac{\Sigma PA}{\Sigma(PA+EI)}$$

We assume that at the optimal level, both operating expenses and cost of goods sold grow at a uniform rate, and $\Sigma PA = q \cdot PA$ and $\Sigma(PA + EI) = q \cdot (PA + EI)$

$$\frac{EI}{PA} = \frac{\Sigma PA}{\Sigma(PA + EI)} = \frac{q \cdot PA}{q \cdot (PA + EI)} = \frac{PA}{PA + EI}$$

Let $r = \frac{EI}{PA}$

Then

$$r = \frac{PA}{PA+EI} = \frac{1}{1+\frac{EI}{PA}} = \frac{1}{1+r}$$

$$r = \frac{1}{1+r}$$

$$r^2 + r = 1$$

$$r^2 + r - 1 = 0$$

$$r = \frac{-1 \pm \sqrt{5}}{2}$$

Since $r \geq 0$ $r = \frac{-1 + \sqrt{5}}{2} \approx 0.62$

Thus, the ratio of long-term to short-term expenses equal the golden ratio (sometimes also called “the golden ratio conjugate”).

As we mention above, for a firm to be sustainable, this ratio must be present at all levels of the company’s organizational structure. Often it is assumed that for a company to expand, it must add new products or expand to other geographic regions. However, a company can also expand by changing its fractal boundaries, i.e. by developing a finer pattern. In this case, it can define subsystems that also exhibit self-similarity, thus rendering the entire system more sustainable.

If, however, this ratio is far from optimum, it manifests itself in two additional domains: the lifecycle of a company and mismatch of resources required to meet internal and external challenges. This mismatch is reflected in the cost of quality.

6. THE GOLDEN RATIO AND THE LIFECYCLE OF COMPANIES

Different ratios of long-term to short-term expenses correspond to the different stages in the company’s life cycle, as described by I. Adizes [1]. During prosperity periods, this ratio is close to optimal (i.e., to the golden section). Once this ratio starts to decrease, it can serve as an indicator that the company is in danger of stagnation and potential decline. The trend of medium-term change and the absolute value of the OE/COGS ratio provide precise quantitative signals as to what phase in its life cycle the company is approaching. ‘Autumnal’ and ‘Aristocracy’ periods (where organizations become complacent and prefer to do nothing rather than take risks) are characterized by low and falling values of this ratio. The reasons are obvious. While management struggles to minimize disruptions on one end, it also reduces expenses on the other. Since production and administrative expenses is difficult to reduce, the most obvious way is to cut long-term expenses, especially expenses linked to entrepreneurship – i.e. slack. In this situation, companies do not possess enough slack to go through with inventions, even when given the opportunity. Such situation is reflected in the falling ratio of long-term to short-term expenses.

7. CONCLUSION

Organization theories seldom offer practical recommendations to managers, especially ones that can be quantified. Successful functioning of a company relies on the sustainability of its competitive advantage. Competitive advantage requires effective implementation of innovations and, according to the O-ring theory, an optimal match between the most productive workers. To achieve these objectives, companies must allocate slack resources. These resources include excess inputs such as redundant employees, underutilized capacities, uncommitted capital expenditures, and unexploited opportunities to increase outputs. Optimal allocation of limited resources within a company should be reflected in the distribution of expenses. This is achieved when the ratio of long-term to short-term expenses at each level within the organization equals the golden ratio. Changes in this ratio to values far removed from the optimum serve as quantitative indicators that the company is entering a stage of decline.

Resources devoted to entrepreneurship and integration are long-term investments, whereas production and administration expenses are short-term expenses. Successful companies have high degree of both entrepreneurship and integration, because they found optimal balance between short-term and long-term expenses. Such a balance corresponds to golden ratio.

The approach described here opens new avenues for further development. In our follow-up articles, we will aim to elaborate on the quantitative methods of predicting and ensuring company sustainability.

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