Published in Slovak Republic
European Journal of Economic Studies
Has been issued since 2012.
E-ISSN: 2305-6282
2018, 7(1): 42-47

DOI: 10.13187/es.2018.7.42
www.ejournal2.com

Subsidiarity management

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Abstract

The article describes subsidiarity management. The article compares hierarchical and subsidiarity management. The article introduces the concept of information construction. The article describes information constructions of hierarchical and subsidiarity control. The article introduces a topological scheme of time intervals for hierarchical control. The calculation of hierarchical control cycle time is provided. The calculation of time for the downstream (managerial) and upstream (reporting) information flows is shown. The calculation of subsidiarity control cycle time is provided. Describes the application conditions of hierarchical and subsidiarity management.

Keywords: hierarchical management, subsidiarity management, information flow, control cycle.

1. Introduction

Modern management is focused on information models and information modeling (Kilov, 1994, Goedert, 2008, Halpin, 2010). In the analysis of control technologies, the concept of information construction (Aksakal, 2005, Tsvetkov, 2014) as generalization of information model and control technology is used. Information construction describes both the technology and the model. Information construction allows to effectively analyze the management structure and management characteristics. Application of information construction allows to optimize control and select the necessary technology for a specific situation.

2. Discussion

Fundamentals of the subsidiarity approach. Subsidiarity (from *Latin* subsidiarius – auxiliary) is an organizational and legal principle that requires to solve the issues at the lowest, smallest or most remote level at which their solution is possible and effective (Paterson, 2002, Haugland, 2010). The areas of application of this principle include the theory of state and law, finance, management, cybernetics, computer science, military science. Modern subsidiarity control is based on the use of information management technologies (Karimi, 2001). Subsidiarity control becomes a necessary tool with a large number of subsidiaries, advanced network management and multinational campaigns (Birkinshaw, 2000).

Subsidiarity management (control) is closely connected with information management. Descriptive and technological means are used to carry out information management. The means of description include, in particular: information constructions, information models and information

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units (Tajima, 1999, Tsvetkov, 2009, Tsvetkov, 2014). Information construction are conceptual description of control technologies, control object and management information resources. Information models are used to describe processes, situations and objects. Information models are used for qualitative separation of control components in the form of situations and managerial processes scenes. This causes the formation of control models as descriptive (Etgar, 2008) and prescriptive (Weber, 1999). Information units serve as the basis for building information models and information construction.

Hierarchical management. Subsidiarity control needs to be compared and connected to the existing types of organizational control models. As a basic control scheme, centric or hierarchical control models are often used (Bitran, 1993, Aldinucci, 2009), which are based on management from the center to the periphery. Figure 1 shows information construction, including flows and hierarchical control construction.

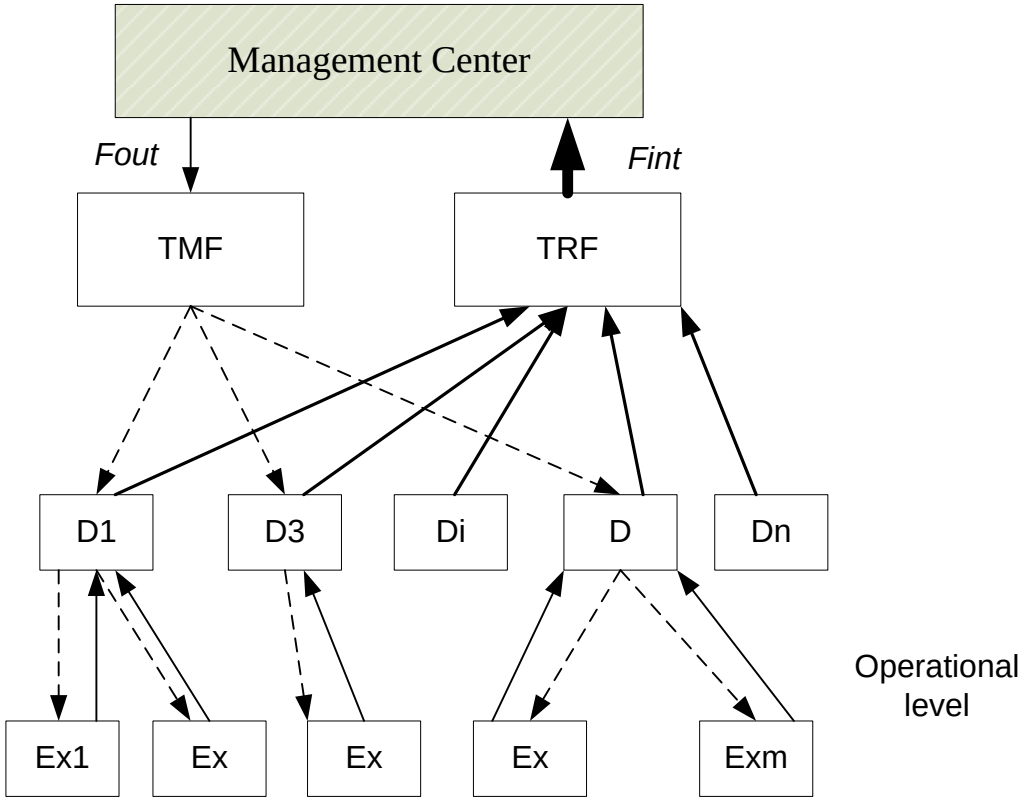

Fig. 1. Hierarchical control information construction

Hierarchical control is based on clear principles of one-man management. Management body is marked with shading in figure 1. This is the main Management Center. Information outflows come out from this center (*Fint)*. Information inflows come into the management center (*Fout*). The management center is served by two units, transformation of management flows (TMF) and transformation of reporting flows (TRF). TMF unit services management (downstream) flows. TRF unit services reporting (upstream) flows. There can be many levels in a real control scheme. But there are three levels applied in this scheme: top, medium and operational. This is necessary for analysis.

TMF unit (top management level) specifies management flows and sends them to the level of distributors. Distributors (D) (medium management level) detail managerial instructions and convert them into technical or industrial assignments. These assignments are sent to the operational level (lowest management level) for executors (Ex). Management flows are marked with a dotted line. Executors perform the assignment and inform management about the results. This creates a system of reporting or upstream flows. Upstream flows are more diverse, as each executor describes the features of the performance of his assignment. As many assignments are at

the operational level, as many different upstream flows are transmitted to the top level. Upstream flows are shown in solid lines. This suggests that the intensity of reporting flows is higher than the intensity of management flows. Distributors send reporting flows to TRF unit. TRF unit systematizes reporting flows, reduces them in volume, but still the information diversity in these flows is much higher than in management flows. This is shown with a thicker arrow that shows the total reporting flow coming in for management.

An example can be given here from sectoral management practice in the USSR. Management documentation and instructions were prepared by a division of 10-20 people, more or less without computational processing. As a rule, reporting documentation was processed by sectoral Main Data Processing Center (MDPC), which employed up to a hundred employees. MDPC obtained information from regional processing centers (distributors level), where dozens of employees worked.

The volume of reporting documentation, systematized and classified in the MDPC, amounted to thousands of pages or more. At the same time, total annual management documentation did not exceed 100 pages. Reporting documentation was drawn up using computer processing methods. Drawing up of reporting documentation with computer processing was much more time consuming than preparation of management information.

Figure 2 shows information construction of the hierarchical management cycle.

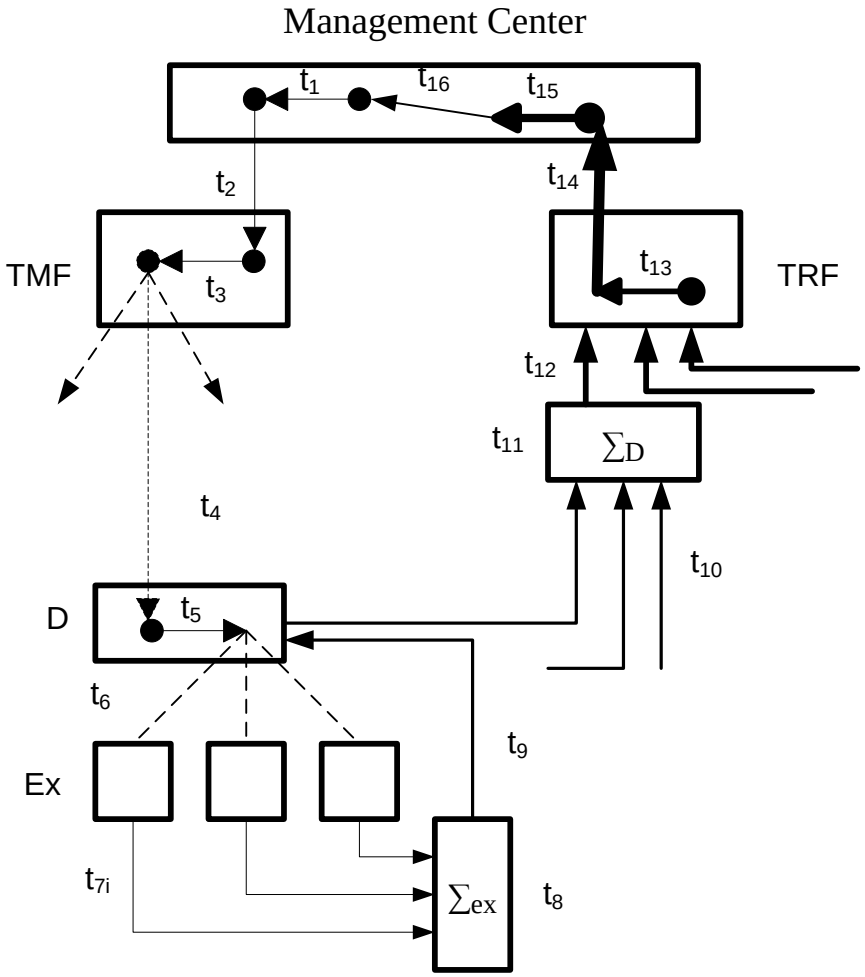

Fig. 2. Hierarchical management cycle information construction

Figure 2 shows the following symbols: t_1 – time of approval and decision-making at the top level; t_2 – time of transfer of managerial decision to TMF for technical follow-up; t_3 – time of technical follow-up of the decision for transfer to distributors level; t_4 – time of transfer of

managerial decision to distributors (parallel process); t_5 – time of technical follow-up for assignment transfer to the executors level; t_6 – time of transfer of managerial decision to executors (parallel process); t_{7i} – time of transfer of reporting information about the executed assignment to the adder (Σ_{ex}) of the executors level (sequential process); t_8 – time of summing up of reporting information from executors; t_9 - time of transfer of reporting information on executed assignments to the distributor; t_{10} – time of correction and transfer of reporting information about executed assignments to the adder (Σ_{D}) of the distributors level (sequential process); t_{11} – time of integration and systematization of information in the adder; t_{12} - time of transfer of the reporting information to TRF; t_{13} – time of systematization of reporting information in TRF for transfer to top management; t_{14} – time of transfer of systematized reporting information to top management; t_{15} – the analysis by the top management of systematized reporting information; t_{16} – development of proposals by top management based on reporting information.

The total time of hierarchical management cycle T_{ch} is determined by the formula

$$T_{ch} = t_1 + t_2 + t_3 + t_4 + t_5 + t_6 + N1\,(t_7) + t_8 + t_9 + N2\,(t_{10}) + t_{11} + N3\,(t_{12}) + t_{13} + t_{14} + t_{15} + t_{16} \quad (1)$$

Here N1 is the number of executors; N2 – the number of distributors on one level; N3 – the number of levels of distributors. The time of management flows T1 is determined as

$$T1_h = t_1 + t_2 + t_3 + t_4 + t_5 + t_6 \quad (2)$$

The time of reporting flows T2 is determined as

$$T2 = N1\,(t_7) + t_8 + t_9 + N2\,(t_{10}) + t_{11} + N3\,(t_{12}) + t_{13} + t_{14} \quad (3)$$

Comparison of (2) and (3) expressions gives grounds to state that the time of reporting information flows under hierarchical control is much longer than the time of management information flows T2 >> T1.

Subsidiarity management structure

Subsidiarity system is characterized by the creation of additional management centers. Figure 3 shows the information construction of subsidiarity management. Management body is marked with shading in figure 3. This is the main management center and local management centers (LM).

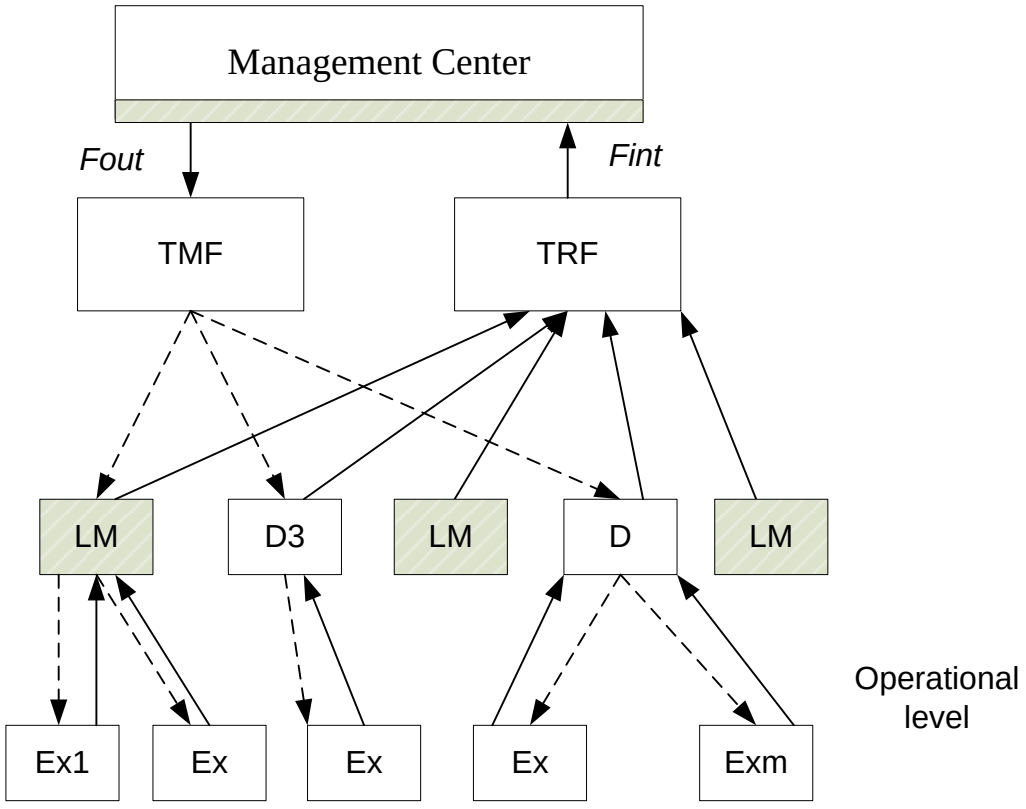

Fig. 3. Subsidiarity management information construction

A shift in management powers from the center to the periphery is typical for subsidiarity control. Local management centers usage shortens the control cycle. The total time of subsidiarity management cycle T_{cs} is determined by the formula obtained by modifying formula (1).

$$T_{cs} = t_1 + t_2 + t_3 + t_4 + t_5 + t_6 + Ns\,(t_7) + t_8 + t_9 + t_{5c} \quad (4)$$

Here t_{5c} is the time of approval and decision-making at local management level; Ns is the number of executors at the local subsidiarity management center.

If

$$T_{cs} \approx T_{ch}, \quad (5)$$

it is reasonable to use hierarchical management, since there is a saving of managerial and material resources in this case, and the overall system reliability increases.

If

$$T_{cs} << T_{ch} \quad (6),$$

it is reasonable to use subsidiarity management.

In addition, it is necessary to take into account the time of change in the state of the object δT_{so}. If

$$T_{cs} < \delta T_{so}, \ \& \ \delta T_{so} < T_{ch} \quad (7),$$

it is reasonable to use subsidiarity management.

If $T_{cs} > \delta T_{so}$, then the object is uncontrollable, and another control method must be selected.

Subsidiarity management is based on the transfer of managerial and legal functions from the center to the periphery. The use of the subsidiarity model in modern conditions takes into account the interrelated conditions: the complication of information management models; compatibility of functional blocks; elimination of intermediate links; globalization; convergence.

Ensuring the compatibility of functional blocks is achieved by integration and application of standardization, harmonization and certification methods. Intermediate links are eliminated based on technologies, systems and organizations integration (including vertical).

With hierarchical management and increase in the number of levels of a company or corporation, the limit of the effectiveness of hierarchical management is reached. In terms of control stability, subsidiarity control can create feedback loops. These loops, if left unattended, can cause control instability. An example is the conflict of interests between the interests of different departments within one company.

On the other hand, local loops, when assigning some general criterion, serve as the basis for the company's self-organization. Under these conditions, there is a transition from linear economy to nonlinear one (Zhang, 2013). This is an advantage of subsidiarity management.

Subsidiarity management is always effectively used in the armed forces in the conduct of hostilities. Hierarchical management requires less qualification of employees and is effective under stereotyped conditions. Each lower level simply executes an order of a higher level. Each individual performs at a certain level only his or her own functions. Such control resembles a product assembly line.

Subsidiarity control requires highly qualified employees at local management centers in comparison with distributors (Singh, 2012). It is more adaptive and technologically corresponds with intelligent control technologies. Subsidiary control is applicable to hierarchical and network structures. With a large number of executors and network management, subsidiary control essentially solves the problem of clustering control objects and reduces the dimension of control object. One of the most developed organizations in management field, the US Department of Defense, repeatedly applied subsidiarity control under different mottos. The most famous campaigns were called “Power to the periphery”. This is fighting in North Africa against Rommel during the Second World War. These are actions under the Desert Storm Operation against Saddam Hussein. The positive experience of these operations indicates effectiveness of subsidiarity control under complex unpredictable conditions.

3. Conclusion

For simple and linear types of management, there is no need to apply subsidiarity management. If the system or control object becomes more complex, subsidiarity management approach should be used. With distributed control and long control chains in the presence of time

delays comparable to the time of change of control object, subsidiarity management is also mandatory. Simplified expressions (1-7) provide an opportunity to assess the need for a particular type of management. Therefore, subsidiarity management is preferable for complex and distributed holding entities.

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