



PRODUCTION ENGINEERING ARCHIVES

ISSN 2353-5156 (print)
ISSN 2353-7779 (online)

Exist since 4th quarter 2013
Available online at www.qpij.pl/production-engineering-archives

Construction-fitting process organization and management in a small business

Zbigniew Respondek¹

¹ Czestochowa University of Technology, Faculty of Civil Engineering, ul. Akademicka 3, 42-201 Czestochowa, Poland, zresp@o2.pl

Article history

Received 02.02.2017
Accepted 15.03.2017
Available online 03.04.2017

Keywords

construction process organization
management in construction
small construction company

Abstract

The article presents results of research concerning identification of organization schemes and management processes that make a small construction company function efficiently and hold against other entities in local markets. It was estimated to what extent the classic principles for organization and management are realized in a small construction company. Basic for that evaluation were the Toyota management principles and the HR organization principles as gathered and quoted by Rowiński. The research was conducted with the guided interview method, supplemented by CAWI (Computer-Assisted Web Interview) survey. Based on the information gathered the characteristics of organization and management of small construction companies active in the business of finishing works were described. The most important elements presented were the owner-employee relations, scope of activities performed personally by the owner, quality assurance methods for works, scope of cooperation with other entities, mode of customer acquisition and ways in which new technologies are adopted. It was found that there is large coincidence between organizational and management principles applied in researched companies, and the rules for the Toyota manufacturing processes, slightly lower coincidence was found in case of analysis of the rules quoted by Rowiński. The research has shown the large universality of the rules found in literature – these are largely accomplished, even without owners and employees having the knowledge about their exact reading.

1. Introduction

The construction-fitting process has its own specifics (RYTEL O. 2009). It differs from industrial manufacturing most of all in that the performance of some operations is dependent on weather conditions (seasonality), in its lack of set location of work (need to stay mobile) and to large extent the unrepeatable conditions of works performed at each site. There are numerous small construction companies that are oriented on serving individual customers in local markets. It is estimated that small and medium construction companies employed 716.5 thousand people in 2013, that is 87% of the total employment in construction industry, and the companies generated 79.6% of total revenues of construction companies. These indicators for micro-enterprises (as a subgroup of small and medium businesses) were 52% and 39.2% respectively. The construction industry was characterized by the biggest share (higher even then that of retail sales) of those working in the smallest companies, out of all branches of economy (GŁÓWNY URZĄD STATYSTYCZNY 2015).

Changes in construction technologies and raising customer demands concerning quality of construction works, including the aesthetics of buildings and spaces led to development of some ways for organizing and managing work that allowed the small construction company to function smoothly and avoid displacement from the market by other, larger entities. Small construction companies also have to face some difficulties that are the result of the characteristics of that type of activities, such as lack of economies of scale, limited access to new technologies or problems with supply logistics (GRZYL B. 2009, ZOWADA K. 2011, TOMCZAK M. 2013).

The aim of the research presented in the article is to define the rules that make a small construction company act efficiently in the market, and to what extent those rules are correlated with the rules advised by literature:

The basis for the analysis were the following:

- 14 management principles included in the Toyota manufacturing system, that are frequently used for analysis of manufacturing processes (BORKOWSKI S., ULEWICZ R.

2011, SELEJDAK J. 2013, BORKOWSKI S., ADAMUS K. 2014),

- rules for organization of human action as quoted by Rowiński, partially from works of other authors (ROWIŃSKI L. 1982).

2. Methodology of research

The research was conducted with method of guided interviews conducted in three small construction companies specializing in exterior and interior finishing works. In each of the respective companies the owner and one of the employees were providing their responses. The companies were deemed representative for the market as they all were efficiently active on it for over 10 years, all the time employing a non-changing number of 7-10 employees each, developing some reputation on the local market. The questions concerned mostly:

- ways for current operations of company, including the owner-employee relations,
- scope of activities performed personally by the owner,
- ways of securing internal quality assurance,
- scope of cooperation with other entities,
- ways for acquisition of customers,
- ways for introducing new technologies.

Based on information gathered conditions determining the effectiveness of operation of small construction company were set. Then the respondents were asked to familiarize themselves with the rules of Toyota and Rowiński and perform a self-assessment of the degree of their applicability in their own company.

The direct research was supported by CAWI (Computer-Assisted Web Interview). This method was used to acquire further 30 survey questionnaires of which 14 were then qualified for further analysis (3 originating from business owners, 11 from employees). The criteria for such qualification were at least 10 years of continuous operation of company, employment figure lower than 10 and the profile of activity of: finishing works in construction industry.

Items 3 to 6 present the model characteristic for organization and managerial rules in researched companies. Item 7 analyses research results for concurrence of organizational and management rules practiced in the company with those quoted by literature.

3. Organization of work in the company

The workday begun, in most cases, with a short briefing in the seat of the company. After the possible gathercollection or supplementation of the required equipment the employees then go to the designated work sites. All the companies hold one or two transport vans and one or two passenger cars.

The basic organizational issue is the securing of continuous work for employees, that is why the companies are involved in two or frequently even three projects at the same time in order to, e.g. in case of bad weather, technological break or other unforeseen circumstances, be able to find appropriate work for all the employees. Any longer stoppage

is, as a principle, unacceptable. The owner (boss) divides the workers into teams of 2-5 people each, with their personal composition changing according to current needs. A designated employee, most often the person who is the most skilled one in currently performed works, manages the current works. Their role is to discipline the workers when the owner is not present on site. Frequently the teams and sites are chosen directly before travelling to the destination, as that choice largely depends on weather and other changeable circumstances.

What the owners care about is the fluidity of works in site and that is why they undertake most of the logistic actions. The rule is also to grant holidays (from a week to two weeks) in Summer to all employees at the same time – the company stops all operations during that period, thus preventing the simultaneous absence of larger number of employees throughout the remaining part of the year.

The rules keeping appropriate discipline include:

- observing work time, with appropriate breaks for meals and rest,
- absolute ban on alcohol drinking,
- absolute prohibition of acceptance of gifts from investors or acceptance of additional orders,
- assigning the care duties for equipment (and in particular the power tools) to specific employee,
- the duty to clean the site and its surroundings at the end of the workday.

The respondents also observe the ever growing awareness of both the owners and the employees when it comes to observing H&S rules. Neglecting those rules in past years (e.g. failure to use PPE, especially during work at heights) was frequent in small companies and led to work related accidents (DĄBROWSKI A. 2013). Additionally, it was observed, among others, that ever growing number of small companies uses uniform work clothes with name and logo of the company imprinted on them, which also leads to increased identification of employees with their company.

4. The role of the owner

It is possible to distinguish several stages in the analysis of development of small construction companies can be distinguished. In the first period of activities, the owners performed much of the physical labour together with employees – at this stage the companies employed two or three employees. The next stage was hiring more employees as the number of orders grew, and, then stabilization of employment. From the viewpoint of the owners of the analyzed companies hiring more employees was not justified hence, as they define it themselves they fear they might lose control over company's activities and they believe the current level of employment is optimal – the staff is replenished once an employee leaves.

The activity of owners is high which one of the most characteristic features of a small company. They perform many of the tasks outside the formal business hours, thus, the border between time assignet for professional activities and free

time is more than liquid. The basic activities of owners include:

- current contacts and agreements with customers,
- logistics of supplies of materials to the sites, large portion of materials are supplied by the owners personally, with use of company's vans,
- bills of quantities and surveys,
- preparing cost estimates for customers,
- current quality assurance, most of all visual checks (BORKOWSKI S., KNOP K. 2013),
- invoicing and production of other necessary company documentation,
- financial settlements.

The owners place a special emphasis on keeping appropriate quality of works. They personally inspect the work every day, frequently in the presence of the contractor and indicated the necessary improvements on the go. This approach enforces the current self-control of employees at work and stops them from undertaking independent actions that would otherwise necessitate consultation, and which could be linked with consequences that would be hard to rectify.

5. Cooperation with other entities

The analyzed companies closely cooperate with wholesale traders of construction materials. Every company cooperated with:

- a general construction wholesale – for basic finishing materials: cements, plasters, plasterboards, insulation materials, etc.
- specialized wholesales or shops that offer narrow scope of high class materials, e.g. latex-acrylic paints, vinyl wallpapers.

Cooperation with wholesales allows them to get rebates and in house transport services in case of larger orders. The wholesales also profit from cooperation with construction companies (RUTKOWSKI M. 2004).

The companies also cooperate with other companies or craftsmen performing other specialized works (fitting windows, blinds, wooden stairs, roofing works, etc.). These entities are used as subcontractors for works that fall outside the scope of own activities of the companies. The analyzed companies and the specialist companies cooperating with them frequently, in negotiations with potential customers, mutually grant references to each other.

Another issue are the tax and insurance settlements, and keeping accounts. In this field the companies utilize the services of specialized accounting services – independent settlements prove to be too time-consuming for the owners.

6. Customer acquisition

The analyzed companies are configured for a certain scope of works and a specific type of a customer. The optimal order is that for complex finishing works (external and internal) for a detached house or at least the internal works for no less than one level or flat. The companies also perform works in an office, retail and service buildings. They do not accept

orders of too narrow a scope of works, nor orders for works that they are not sufficiently experienced in.

The companies also avoid customers who wish to use the cheapest technologies and materials, or use inappropriate technologies, as they adhere to the rule of keeping an appropriate level of used materials and the final visual effect of works. The owners frequently act as customer advisors – basing on their experience they are able to come forward with alternative solutions (higher or lower standard of finish that is linked to the costs) and leave customers with options to choose from.

Today the finishing works experience the rapid introduction of new technologies and new design solutions, frequently influenced by currently dominating style. Cements, paints, thermal and water insulation materials, etc. have ever improving technical specifications. What is also considered is the durability and functionality. The use of new solutions is frequently the consequence of a customer's wish. Companies do not fear new solutions, still their introduction follows with significant caution. First the owner gathers as much necessary information as possible, e.g. if anyone tested the technology in practice and what results of it were. Sources of information frequently include the wholesale or store the company cooperates with, and also local visits to already completed objects.

The aforesaid approach, and mostly the care for quality, made the companies develop reputation over more than ten years of their activities. They do not suffer from the lack of orders. Their owners estimate, that they win 70 to 80% of all orders through recommendation, that is the good word about them shared between their customers. The remaining orders are acquired in different ways (web advertising, public tenders, etc.)

7. Evaluation of degree of application of organizational and management principles

Tables 1 & 2 present the averaged results of self-evaluation of application of Toyota and Rowiński principles in small construction companies, based on 6 direct interviews and 14 web surveys. The principles in tables are quoted in abbreviated form. Full reading of the principles of the Toyota manufacturing system can be found in literature, e.g. (BORKOWSKI S. 2013, LIKER J.K. 2004, OHNO T. 1988), and the rules presented by Rowiński in: (ROWIŃSKI L. 1982, pp. 38-53). Respondents evaluated their answers on a 0 to 5 scale, where 5 marked the total application of the respective principle and 0 lack of application of that rule. If the respondent decided that the respective principle was not applicable to a small construction company, the answer was marked with a dash. The results presented in tables 1&2 reflect the average grades in the group of respondents (owners, employees). A dash indicates that more than 50% of respondents believed that the application of the respective principle was not justified.

Table 1. Self-evaluation results for degree of application of Toyota management principles

Principle	Average grade of owners	Average grade of employees
1. Long term management philosophy	4.17	3.93
2. Continuous process of problem identification	3.50	3.14
3. Avoiding overproduction	-	-
4. Leveling out workload	3.67	3.79
5. Halting the process to solve problems	4.17	3.71
6. Process standardization	3.83	3.71
7. Use of visual control	4.83	4.36
8. Use of tested technologies	4.67	4.36
9. Grow leaders	3.50	4.00
10. Develop people who follow the company philosophy	-	-
11. Respect your partners	4.67	4.43
12. Engage personally	4.50	4.21
13. Make decisions slowly, but implement them rapidly	4.17	4.00
14. Become a learning organization	4.33	4.14
Global average score :	4.17	3.98

Source: own research

Table 2. Self-evaluation results for degree of application of Rowiński's organizational principles

Principle	Average grade of owners	Average grade of employees
use of research and experience	-	-
normalization of work	3.50	3.36
control	4.50	4.00
optimal result (economy of action)	4.00	3.50
work division	3.33	3.29
concentration	-	3.50
harmonization	-	3.86
work uniformity and rhythm	3.50	3.43
using reserves	-	3.29
preventing	-	3.64
work intensification	3.50	3.43
individual efficiency	3.83	3.86
collective efficiency	3.67	3.64
elasticity	4.67	4.36
minimization of personal intervention	3.50	3.43
material order	4.17	3.86
deferment	4.00	3.64
anticipation	4.33	4.14
avoiding unnecessary delays (time-keeping)	4.17	4.07
readiness	4.50	4.14
using resources	3.50	3.71
counteracting resistance to changes	3.67	3.57
reliability of action	3.50	3.86
piloting	3.83	3.50
work environment	3.17	3.36
insolation of different efforts	-	-
Global average score :	3.84	3.68

Source: own research

In addition to information included in Tables 1&2, the biggest discrepancies in the analyzed questionnaires were found, when Toyota principles are taken into account, in case of:

- “continuous process of problem identification” with standard deviation of 1.049 for the group of owners and 1.512 for employees,
- “process standardization” with standard deviations of 1.162 and 1.139, respectively.
- In case of Rowiński's principles the largest variance was found in case of:
- “work division” – with standard deviation of 1.033 in the group of owners and 0.994 for the employees,
- “work environment” with standard deviations of 0.983 and 1.008, respectively.

8. Summary and conclusion

The analysis conducted in the article proved that there are some rules for organization and management developed in small companies performing construction and fitting works, that enable efficient and long-lasting operation. What is most important is the personality and engagement of the owner and his/her effectiveness in keeping discipline and making the employees apply some rules of conduct. This concerns mainly the appropriate quality (of material and workmanship), the awareness of control, the openness to new (still already tested) technologies, the elasticity of action (connected with the specifics of construction-fitting business) and reputation won on the local market (ZAKRZEWSKA-BIELAWSKA A., 2009).

The self-evaluation conducted by owners and employees who were previously unaware of the existence of some classic principles of organization and management proved that the processes developed in particular companies are largely concurrent to those rules. The self-evaluation level of owners is slightly higher than that of employees, which is understandable, possibly as a consequence of some subjectivism of approach to company's activities. The Toyota management principles, formulated for completely different type of activity (large multinational, industrial manufacturing) are, according to respondents, applied to an average degree of 4.07/5 (average of grades by owners and employees). The rules for organization collected and presented by Rowiński are applied to a degree of 3.76/5 – in this case the average is lowered by grades for “work environment principle” and “division of work”, which in case of a company with small number of employees are hard to implement.

It may also be observed, that some of the principles that were graded as applied to a relatively low extent (with low grade average) were characterized by large differences between the particular grades. This may prove that these principles only function well in some construction companies. The degree of application of those rules will most likely be increasing with the development of the broadly understood “culture” of organization and management.

Reference

- BORKOWSKI S., ULEWICZ R. 2011. *Toyotarity. Heijunka. Monography. Editing and Scientific Elaboration*, Yuri V. Makovetsky, Dnipropetrovsk.
- BORKOWSKI S. 2013. *Toyotarity. Term, model, range*, Production Engineering Archives 1, No 1, 2-5.
- BORKOWSKI S., KNOP K. 2013. *Visual control as a key factor in a production process of a company from automotive branch*, Production Engineering Archives 1, No 1, 25-28.
- BORKOWSKI S., ADAMUS K. 2014. *Presentation of results in the BOST method on the example food industry company*, Production Engineering Archives 4, No 3, 26-28.
- DĄBROWSKI A. 2013. *Wybrane problemy BHP w małych firmach budowlanych (Basic OSH problems in small construction companies)*, Bezpieczeństwo Pracy 7, 12-15.
- GŁÓWNY URZĄD STATYSTYCZNY 2015. *Małe i średnie przedsiębiorstwa niefinansowe w Polsce w latach 2009-2013 (Small and medium non-financial enterprises in Poland in 2009-2013)*, Warszawa.
- GRZYŁ B. 2009. *Specyfika budowlanego przedsięwzięcia inwestycyjnego z perspektywy procesów logistycznych (Specific nature of construction investment project from the perspective of logistic processes)*, Logistyka 6, 1319-1327.
- LIKER J.K. 2004. *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*, Mc Graw-Hill, New York.
- OHNO T. 1988. *Toyota Production System. Beyond Large-Scale Production*, Productivity Press, Portland, Oregon.
- ROWIŃSKI L. 1982. *Organizacja produkcji budowlanej (Organization of construction production)*, Arkady, Warszawa.
- RUTKOWSKI M. 2004. *Lojalni klienci jako element przewagi konkurencyjnej dystrybutorów materiałów budowlanych - wyniki badań (Loyal customers as a factor of competitive advantage in building materials distribution channels - research results)*, Acta Universitatis Lodzensis Folia Oeconomia 179, 259-264.
- RYTEL O. 2009. *Specyfika produkcji budowlanej (Specific of construction production)*, Zeszyty Naukowe Akademii Podlaskiej w Siedlcach, Seria: Administracja i zarządzanie 83, 159-171.
- SELEJDAK J. 2013. *Use of the Toyota management principles for evaluation of the company's mission*, Production Engineering Archives 1, No 1, 13-15.
- TOMCZAK M. 2013. *Problemy w logistyce małych i średnich przedsiębiorstw budowlanych (Logistic problems of small and medium construction enterprises)*, Technika Transportu Szynowego 10, 637-645.
- ZAKRZEWSKA – BIELAWSKA A. 2009. *Ocena konkurencyjności małych firm budowlanych regionu łódzkiego (Competitiveness assessment of the small construction companies in the Lodz region)*, [in:] *Konkurencyjność jako determinanta rozwoju przedsiębiorstwa (Competitiveness as a development determinant of enterprise)*, S. Lachiewicz i M. Matejun (red.), Monografie Politechniki Łódzkiej, Łódź, 312- 321.
- ZOWADA K. 2013. *Business Cooperation of Logistics Companies with Small and Medium Enterprises - Research Report*, Journal of Economics and Management 12, 111-120.

建築施工過程的組織和管理在一個小企業

關鍵詞

施工過程組織
建築管理
小型建築公司

摘要

本文介紹了確定組織方案和管理流程的研究結果，這些方案和管理流程使小型建築公司高效運行，並與當地市場的其他實體保持聯繫。據估計，一個小型建築公司在多大程度上實現了組織和管理的經典原則。該評估的基本內容是豐田管理原則和Rowiński收集和引用的人力資源組織原則。研究採用指導性面試方法，輔之以CAWI（計算機輔助Web面試）調查。基於所收集的信息，描述了在精加工業務中活躍的小型建築公司的組織和管理的特徵。提出的最重要的要素是所有權 -

僱員關係，所有者親自執行的活動範圍，作品的質量保證方法，與其他實體合作的範圍，客戶獲取模式和採用新技術的方式。發現在研究公司中應用的組織和管理原則之間存在大的巧合，並且在分析Rowiński所引用的規則的情況下，發現了對於豐田製造過程的規則略微更低的巧合。研究表明，在文學中發現的規則具有廣泛的普遍性 -

這些都是基本完成的，即使沒有所有者和員工知道他們的準確閱讀。
