

INTERCOMMUNICATION DIFFERENTIATION OF PRODUCTION DEPARTMENT: KIO KERAMIKA d. o. o. CASE

Dinko Jović, Darko Krmpotić, Verica Hocenski

Preliminary notes

Specifics of internal communication process in production department and other departments in ceramic industry are compared. Literature otherwise suggests quantitative analysis optimization approach. Shortcoming of management process optimization in ceramic industry is improved by examining and structuring business and communication processes, and by using quantitative methods. Specifically the following issues are explored: i) internal communication processes in the stratified and segmented production system in ceramic industry; and ii) business processes and organization. The differences between external production system efficiency components: technology, man-power, and innovations and marketing are considered. The following methods are used: factor analysis as qualitative communication measure; and pair-wise comparison in aggregation of inter-segment communications. By using pair-wise comparison authors have emphasized the importance of organizational segment cohesion and inter segmental communication. The following aspects of business pragmatics are important: the possibility of management influence on enterprise segments and on inter-segment cohesion by changing direction and information content as derived from pair-wise comparison analysis. Such analyses indicate the advantage of using quantitative variables in management process optimization.

Keywords: *business process, internal communication, management, organization segment, pair-wise comparison, production efficiency*

Interkomunikacijska diferencijacija proizvodnog odjela: slučaj KIO Keramika d.o.o.

Prethodno priopćenje

Uspoređuju se značajke interne komunikacije u keramičkoj industriji između proizvodnog i ostalih odjela koje se u literaturi optimiziraju kvantitativnim analizama procesa. Nedostatak optimizacije rukovođenja poslovima u industriji keramike nastoji se poboljšati ispitivanjem i strukturiranjem komunikacijskih procesa i kvalitativnom metodom. Pri tome se istražuju: i) proces interne komunikacije u stratificiranom i segmentiranom sustavu proizvodnje keramičke industrije u odnosu na ostatak organizacije te ii) poslovni procesi i njihova organizacija. Razmatraju se razlike između učinkovitosti komponenti vanjskog proizvodnog sustava: tehnologije, radne snage te inovacije i marketinga. Vanjski proizvodni modeli temelje se na podacima učinkovitosti. Korištene su metode: faktorska analiza kao kvalitativna komunikacijska mjera te uparivanje pojmova pri objašnjavanju inter-segmentne komunikacije. Rabljenjem metode uparivanja pojmova autori naglašavaju važnost kohezije organizacijskih segmenata i inter-segmentne komunikacije. Važna su sljedeća gledišta poslovne pragmatike: menadžment može utjecati na tvrtkine segmente i inter-segmentnu koheziju mijenjanjem smjera i sadržaja informacija izvedenih iz analize metodom uparivanja pojmova. Analize ukazuju na pogodnost uporabe kvantitativnih čimbenika pri rukovodstvenoj optimizaciji procesa.

Ključne riječi: *interna komunikacija, menadžment, organizacijski segmenti, poslovni procesi, proizvodna učinkovitost, uparivanje pojmova*

1 Introduction – concept construction

Production process is based on human and machine workforce. While machine part of the production is defined by the degree of automation and robotics, human part is much more complex in the production process endeavour. Research carried out and presented in this paper was done in a highly automated and robotized production process and is focused on the human part of the workforce (KIO Keramika d.o.o, hereafter Organization). Organization aims are rationalization of all processes, particularly the production process.

Research is based on assumption of reasonable and rational behaviour of people in general and of any productive collective in particular. In theory, human behaviour is reasonable – having its semantic, pragmatic and apobetic (goal oriented) levels. Any production company is primarily a rational organization – it has its own purpose and formal organization of number of people in different organizational internal segments (e.g. levels, departments, individuals). Therefore communication within organization is also reasonable and rational in all organizational segments. Company's business processes are rationalized by means of peer to peer communication. Moreover, while practicing their functions, managers communicate in respect to feedback obtained from their employees. Such discourse, defined as socially useful language utilization, is related to corporative communication in a specific business process of ceramic industry – Organization. Useful language utilization is rational when all employees equally comprehend

communicated terms/words. Total comprehension of communicated terms/words by employees represents actual communication context of organization. Understanding of communicated terms/words among employees represents actual organizational communication context. In reality, in majority of business processes real communication situation differs from rational or ideal and, in general, employees comprehend and act unequally in respect to communicated terms/words. Therefore, business processes are not conducted in the best possible rational way. In order to analyze communication situation our conclusive assumption is that it is crucial to determine several key words/terms which will encompass, in the best possible way, business processes of the company. Key word/term is a word or a term that is common to all employees which is crucial for reasonable performance of the observed production process in Organization.

Rationale of the production department in Organization is a basic requirement for its subsistence on the market. The rationale can be adequately observed: by doing pair-wise comparison of the key words/terms as a tool of evaluating business processes (first hypothesis); by analyzing grades given to key words/terms which represent a way to measure inter-segment communication (second hypothesis); and by synthesis of paired key words/terms which could point to necessary managerial decisions when optimizing business processes within production department in respect to the rest of the Organization (third hypothesis).

2

Current research and methods used

All quantitative data – from general such as: organizational scheme, business and communication processes, technology usage and technological operations, management process and quality control; to specific ones such as: production, company, progression, earnings, etc. – can be transformed into rational quantitative data whose analysis and interpretation will enable description and improvement of Organization management processes.

2.1

Current research

Qualitative methods have long been used in research of business, management and markets. Current research related to qualitative methods can be divided to:

- 1) Pair-wise comparison method is used to obtain context information or values from qualitative variables;
- 2) Descriptive methods are used when defining or analyzing individual elements of organization;
- 3) Numerical methods are used wherever there is a need for quantification of qualitative information.

In spite of great tendency toward qualitative research by many authors (Van Maanen, 1979; Reason and Rowan, 1981; Crompton and Jones, 1988; Boje, 2001; Prasad and Prasad, 2002 – according to Cassel et al, 2006, 291 [1]) Cassel and colleagues consider that research that usage of qualitative data is not sufficiently represented. During the last few decades there are not only numerous books and articles on qualitative research but there are also numerous magazines such as: *Qualitative Research, Management Decision, Human Organization, Gestalt Theory: An International Multidisciplinary Journal, Qualitative Market Research: An International Journal...*

Generally, papers that cover area of this research are abundant, but specific focus of this paper is not sufficiently represented. Methods' characteristics for all three above mentioned groups are used and emphasis is made on integration of numerical and descriptive methods.

2.2

Methods used and specifics of qualitative and quantitative research of Organization

Basis of this paper is qualitative research by pair-wise comparison grading that shows "which of each entity (in this paper – key words / terms) is preferred, or has a greater amount of some quantitative property" (Wikipedia, 2012 [2]). Pair-wise comparison data (key words / terms grades) were thereafter qualitatively examined by using cluster methods and methods of multidimensional scaling (hereafter clustering and MDS). Fundamental assumption of cluster analysis is to solve grouping of elements (units, subjects, phenomena, etc.) based on their features or attributes so the elements within grouping, or cluster, have a high degree of "natural association", while simultaneously in this way formed "collectives" or clusters are "relatively distant" between themselves (Topolovec 1980 – citing Szivovicza, 2006 [3]). Generally, quantitative methods are analytical by nature and cannot provide objective synthesis of acquired knowledge. That, in fact, is their interpretative weakness. In contrast, multivariate analysis, i.e. methods that allow simultaneous analysis of several characteristics,

are synthesising by nature (Szivovicza, 2006). Rows 2 and 3 in Tab. 1 display quantitative and qualitative methods' characteristics comparison. Characteristics of qualitative methods cited by Amaratunga et al. (2002, 20) [4] (column 3) represent leitmotiv of this paper. These characteristics are explained from the context of perception of actual conditions in any organization (column 1).

Table 1 Characteristics of quantitative and qualitative methods

Actual condition (1)	Quantitative methods (2)	Qualitative methods (3)
In business processes actual communication situation differs from rational or ideal.	Inquiry comes from the outside.	Inquiry comes from the inside.
Employees communicate on all levels – semantic, pragmatic, and apobetic.	Underpinned by a completely different set of epistemological foundations from those in qualitative research.	Attempt to take account of differences between people.
Attempt to rationalize business through structural and communication processes.	Are simply different ways to the same end?	Aimed at flexibility and lack of structure, in order to allow theory and concepts to proceed in tandem.
Feedback is a key to understanding communicated terms/words.	The results are said to be "hard generalisable data".	The results are said to be, through theoretical generalization, "deep, rich and meaningful".
Pair-wise comparison method on qualitative variables provides context information (value).	Involves the follow-up of various states of the scientific research.	Inductive – where propositions may develop not only from practice, or literature review, but also from ideas themselves
Key word / terms are necessary for a reasonable operation of any organization.		An approach to study of the social world, which seeks to describe and analyse culture and behaviour of humans and their groups from the point of view of those being studied.

Source of columns (2) and (3): Amaratunga et al. (2002, 20)

In the hypothesis construction and during conducting this research the following facts linked to qualitative and quantitative research are important:

- 1) Connecting employees to organizational identity and business processes is possible if reciprocal understanding of words and concepts within organization exists. Proper functioning of meta-communication is preconditioned with sufficient resources or possibilities and vision of every individual employee which in turn helps more objective perception of processes and situations in organization (see Haralambos, 1992, 5 [5] and Brajša 1993, 87-89 [6]).

- 2) Clearly defined methodology and scientific principles of research; well planned research with its' known end-purpose; using complete and integral qualitative data that describe everyday and usual occurrences within Organization (see Ryan, 1995, 96 [7]; Amaratunga et al, 2002; Eldabi et al., 2002 [8]; and Cassel et al., 2006).
- 3) Precise rules and steps of qualitative research (see Jović, 2006, 138-140 [9]) in order to take into account communication and organization processes within Organization structure.
- 4) Concepts of validity, reliability, generalizability and carefulness (see Stenbacka, 2001 [10]).
- 5) Complements of qualitative and quantitative research and positivistic approach explain objective measurements which enable statements on causes and effects of processes in Organization (see Amaratunga et al., 2002; and Haralambos, 1992 [17, 18]).

Therefore, grading qualitative terms/words is an attempt to comprehend employees' opinions on processes in organization using feedback or bottom-up approach. In contrast to classic qualitative research of "satisfaction" or "work climate", by using pair-wise comparison method (quantitative-qualitative research) it is possible to avoid abstract semantic perception of terms/words on behalf of employees and to ensure that terms/words are perceived contextually during present employee-Organization relationship.

3

Workforce information

3.1

Description of production process

Production process is defined by procedures given in documents marked PO-09-01 and PO-01-02 and by related work instructions. Work instructions define ways and reasons of executing activities in preparation and realization of production. Process is run in a way of determining key process parameters that are measurable and thus give important information on process efficiency and enable exact conduction and control of production process.

Fig. 1 shows activities in production realization of two production types: press and extrusion. All mentioned activities in production realization process are arranged singularly according to process modelling as interdependent batch processes in which output of one process is input of another.

Organization uses Process of measurement and grading (PC-10) that is part of Integrated management system due to the reasons of:

- 1) Proving conformity of process parameters within default production parameters
- 2) Proving conformity of products (which is done in internal control sector, department of technology and production control) in accordance with PC-10-01
- 3) Following and realizing set goals, processes and procedures and thus assuring:
 - a) Conformity with Quality management system and its continuous improvement
 - b) Conformity with TQM concept.

Activities of production monitoring are done in the exact and determined sequence of technological operations along with defined and controlled features of process and products. Employees and team leaders monitor production

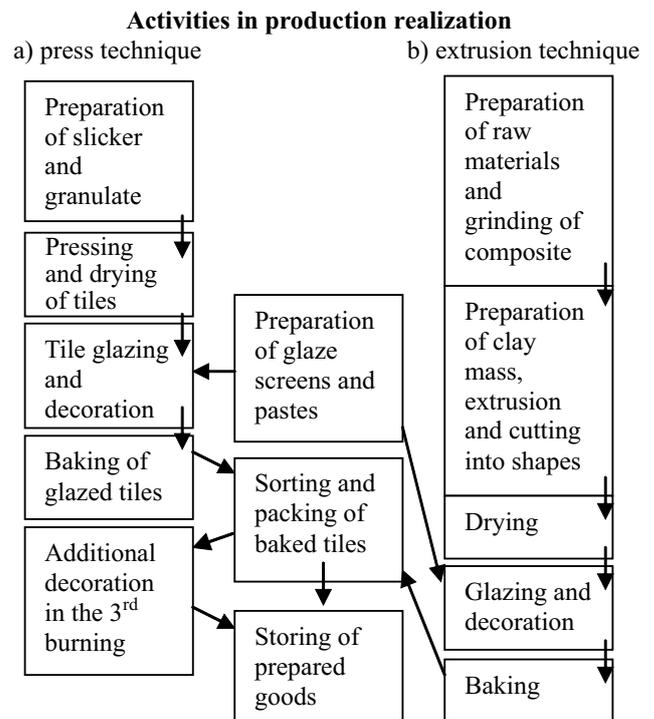


Figure 1 Activities during production realization

process and control process parameters so that final product would comply with technical norms and buyer requests. There are two kinds of controls in Organization – continuous control and instant control. Continuous control is done by employees involved in production process whose job is to keep the parameters within default allowances.

For the purposes of this paper query and inquiry was done regarding process automation, quality control and work procedures control. High levels of discipline and production procedure compliance was determined. Production process is completely transparent and independent of individual employees' acts. Any difference in communication processes as suggested in hypothesis should be observed in organizational-motivational aspects.

3.2

Organization's situation

Organization is troubled by financial difficulties and business is conducted in specific economical and political circumstances that are described as characteristic for Croatian transitional period at the end of 20th century (Čižmar and Poljanec-Borić, 1997, 290 [11]; Sirotković, 1996 [12]). There are many factors that, other than having influence on business, define employees' attitudes and opinions. In such surroundings construction, implementation, and elaboration of survey is not a simple "field work" of annotation and selection of key words/key terms. It is dynamic and complicated process that implies very intensive and attentive research preparation. Moreover, interpretation of research results requires a lot of understanding and knowledge of real situation in the observed Organization. It is also important to take into account outer factors that influence business. Application of solutions that arise from research results is dependant on the above mentioned factors.

During the research in Organization there are 472 employees in total. There are two geographically separated production sites for tile production. Production site

"Orahovica", structurally more complex, has five organizational levels (not taking into account Organization's board of directors) and six main sectors: production and technology, economy and finances, commercial, development sector, system management sector, human resources sector and headquarters with board of directors. Production and technology sector consists of two production units (pressed and extruded tiles) and three logistics units (electro maintenance, energy and machinery maintenance, and informatics department). Production unit consists of six sub-departments. Production site "Rujevac", structurally less complex, has three organizational levels and three main sectors. Business is conducted in three shifts. Production is work-intensive but employees get significant help from automated and robotized production lines.

4 Survey construction and implementation

Key words/terms selected for the survey construction are collected by selection of most frequent employee replies on most important organizational issues. Of 14 selected terms that are paired total of 91 pairs are obtained. During survey construction principles of simplicity and conceivability are taken into account and one universal question was asked: "How do you grade closeness and/or congruence of paired terms?" All pairs have been placed on two A4 format papers, "check-the-right-answer" boxes where scaled from 0 to 10 – zero signifying minimal closeness and ten signifying maximum closeness. Key words selected were defined in the survey and additional clarification was available during the survey implementation.

335 employees participated in the survey (79,76 % of currently available or 70,97 % of total number of employees). During the survey implementation, considering the survey's clarity and simplicity, there were no limitations whatsoever. Survey implementation, conducted in small groups, was simple enough. Time necessary for individuals to complete all answers was between 15 and 20 minutes.

In subsequent survey processing the following was observed: 1) 11 invalid surveys due to distinctive illogical answer. Therefore, there are 324 answered surveys that are basis of this research. 2) 17 incomplete survey headers containing organizational data where additionally extrapolated or the answers where included in higher organizational level regarding the possibility of result interpretation. 3) Of total number of possible paired terms (29 484) there are 28 455 values or 96,51 %. Considering research and analysis methods (clustering and MDS), incomplete surveys were equally included in the survey processing.

5 Research results

Survey results are displayed and analysed at the level of the following organizational segments: 1) whole Organization without production sector and 2) production sector. All levels and sub-departments are investigated within the above mentioned sectors. Most appropriate cluster method selected was *Complete linkage*. Average values of individual terms are also considered. Those grades refer to arithmetic mean of all pairs' grades that consist of a certain term (hereafter: mean). Higher means generally

point out to higher closeness of words/terms and also explain that employees show higher awareness of the role of those words/terms in production and communication processes within Organization. However, without examining closeness of words/terms by using clustering and MDS, it is not possible to make a quality analysis of production and communication processes.

Figs. 2 and 3 show results of clustering for the whole Organization without Production sector, and for Production sector by itself. Ordinate represents words/terms distances ranging from 0 to 10. Abscise represents the words/terms. Lesser the values, more close represented words/terms are.

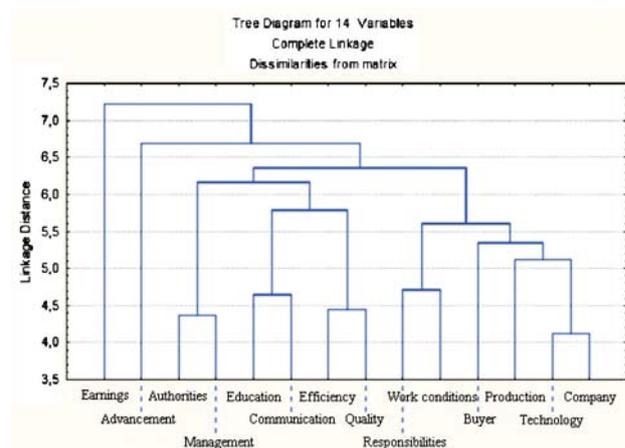


Figure 2 Cluster analysis for complete Organization without Production sector

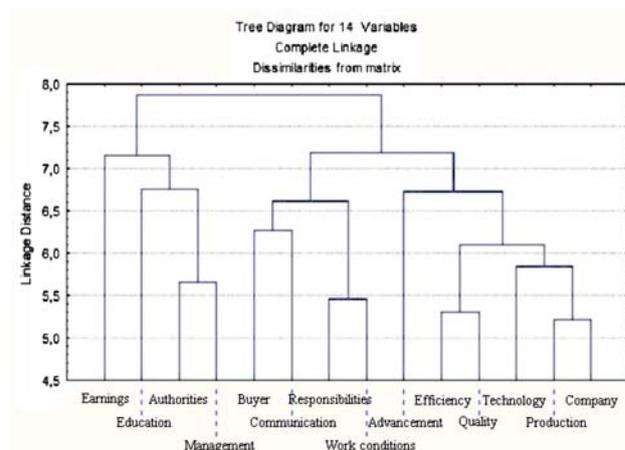


Figure 3 Cluster analysis for Organization's Production sector

Table 2 Distance means

Organization w/o production		Production sector	
Earnings	6,51	Earnings	7,12
Advancement	6,15	Authorities	6,78
Authorities	5,89	Education	6,75
Education	5,85	Advancement	6,71
Buyer	5,73	Work conditions	6,68
Communication	5,70	Communication	6,61
Efficiency	5,66	Management	6,52
Management	5,64	Buyer	6,45
Responsibilities	5,62	Efficiency	6,37
Work conditions	5,58	Quality	6,34
Quality	5,47	Company	6,32
Company	5,45	Technology	6,17
Technology	5,33	Production	6,12
Production	5,31	Responsibilities	6,12

Tab. 2 shows distance means based on Figs. 2 and 3. Survey values, which asked for closeness or congruence, are inverted. Higher numbers represent higher distance, or lower arithmetic mean of grades given to specific word/term in the survey. Therefore, term *Earnings* has the lowest mean and terms *Production* and *Responsibilities* have the highest mean.

6

Discussion and conclusion

By collating results of pair-wise comparison – their clustering and mean values – it is possible to get an objective picture of organizational business and processes as possible. Simultaneous analysis of means and clustering can point to possible rationale problems within two examined Organization's segments which in turn reflect on business and communication processes. Since total number of data obtained from the survey is sufficient for probabilistic reasoning on inter-segmental differences and Organization's work optimization in general, most evident deliberations are as follows:

- 1) Three terms – *Technology*, *Production* and *Company* – are the ones that most commonly form clusters, which is logical in regard to kind of business processes in Organization.
- 2) It is possible to conclude with a high degree of certainty that four key words/terms – *Earnings*, *Authorities*, *Advancement* and *Education* – are the ones in need of most managerial attention. Term *Earnings* is the most distant which is congruent to the results of previous surveys in Organization that pointed out *Earnings* as being the most problematic key word / term.
- 3) Strategies for addressing employees' perception on (in)adequate work compensation surpass the span of this paper. However, results clearly show that distance in grouping of terms – *Earnings*, *Communication*, and *Advancement* – requires management to find a solution consisting of more active measures of rewarding and penalising employees' work and engagement.
- 4) Deliberation 3 is helped by a very important detail – great relative distance of terms *Authorities* and *Responsibilities*. This might be explained as Organization's lack of productive balance of those two terms. It seems that employee's recognition of responsibilities (especially in Production sector) is not fully appreciated by the management. Moreover, results point out to the fact that employees' authorities are highly underappreciated.
- 5) Results indicate that Organization is neglecting activities of market communication. Moreover, an inversion of perception of business processes has been determined – production sector is grouping term *Buyer* with term *Communication* while Organization without production sector groups *Buyer* with terms such as *Production*, *Technology*, and *Company* – as if no one has the right approach toward buyer. This might be interpreted as an indicator that employees view buyers in a rather abstract way and that have little influence on terms such as *Buyer* and *Communication* and consider them “inappropriate”. Also, such “misplacement” of term *Communication* could be interpreted as a lack of affirmative vertical communication in Organization.
- 6) Poorly graded and relatively distant term *Advancement* could be interpreted that employees, at the moment of survey answering, do not see their and the company's

better future. No matter of the fact that Production sector does place term *Advancement*, although relatively distantly, into a cluster with the terms *Company*, *Production*, *Technology* – survey results indicate Organization's problems with employees' work motivation. Along with distant term *Education* (especially for Production sector) it could be advised to Organization's management to involve its employees more actively in business processes enhancement.

- 7) Expectedly, the term *Work conditions* is graded lower by employees in Production sector. In general, overall grades of this term are appropriate since it does not only refer to conditions in production facilities. It is possible to conclude that in spite of work-intensive production employees value company's logistics efforts.

Quantitative and qualitative research of Organization gave results that greatly concur with real and established situation in the company that was observed during the research. Moreover, quantifying, analyzing and synthesising otherwise “unreadable” qualitative data truly provides for more accurate directives on management activities in order to optimize business processes. Therefore, it is possible to conclude that first and second hypothesis – pair-wise comparison grading of business processes, and analysis of key words/terms grades as a way to measure inter-segment communication – are correct. Third hypothesis remains partly not proved since positive prescription surpasses the span of the paper. However, it is possible to assume, based on positive results that prove first two hypotheses, that the results of applied methods could be used as a part of strategic management directives.

7

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Authors' addresses***Mr. sc. Dinko Jović***

College of Market Communications Agora
Trnjanska cesta 114
10000 Zagreb
Croatia
e-mail: dinko.jovic@inet.hr

Mr. sc. Darko Krmpotić

KIO Keramika d. o. o.
Vladimira Nazora b. b.
33515 Orahovica
Croatia
e-mail: dkrmpotic5@gmail.com

Mr. sc. Verica Hocenski

KIO Keramika d. o. o.
Vladimira Nazora b. b.
33515 Orahovica
Croatia
e-mail: vhocenski@kio.hr