

AUDIT AS A TOOL OF A METALLURGICAL ENTERPRISE IMPROVEMENT

GÓRSKA Monika¹

¹*Czestochowa University of Technology Department of Production Management and Logistics,
Częstochowa, Poland, EU*

Abstract

The paper presents the use of audit as a tool to improve the operation of a metal sector company. The issue of significance of performed audits and their impact on the operations has also been raised. Investigations were carried out based on documentation collected during internal audits. The article presents a number of internal audits carried out in 2011-2015. It presents the implementation of the audits conducted in different units of the company. Also discloses the structure and type of discrepancies in individual systems. The share of these incompatibilities is presented in Pareto-Lorenza's charts. It also presents the number of the incompatibilities with the division into centers of occurrence. The article presents the number and types of improvement activities (corrective, preventive and other improvement) in the different units of the company. The adopted method of improvement through audit enabled not only to distinguish areas, which should be improved, but also revealed to what extent such changes should be made.

Keywords: Audit, improvement, ISO management systems

1. INTRODUCTION

In the era of so strong fight for a customer each enterprise, willing to stay on the market, must improve not only the product itself but also processes contributing to its coming into being. So every action in an enterprise, which results in a product or adds some value to it, may be presented as a process or its component. At the same time the improvement processes, i.e. introducing improvements, have a crucial importance for the company development. This has been confirmed by numerous studies, which show that the introduction of improvements to processes has a strong and very strong influence on the development of as many as 75% of surveyed enterprises [1]. Therefore improvement in processes proceeding in the enterprise enables raising the efficiency of specific entity operation. Problems occurring in the organisation require continuous improving of its operations. Problems solving and their identification contribute to improving of the quality management system in the whole enterprise. Quantification of the problem (statistical methods, Pareto-Lorenz diagram, FMEA method, qualitative capacity coefficient etc.) is a condition for improvement as well as suggesting of a solution. What's more, around 80% of problems may be resolved using so-called seven classical quality management tools (7Q) [2, 3]. Also audits, treated not only as the necessity for carrying out a periodical check on implemented systems, but - and may be first of all - as a tool aimed at improvement to effectiveness of carried out activity, are important in striving for problems identification and resolving in enterprises. However, to make the audits a tool of improvement to processes occurring in the enterprise, specific conditions must be fulfilled, i.e. such that the quality of performed audits and usability of their results should be reflected in making decisions on the company future. Pursuant to PN-EN ISO 19011:2012 standard audits are carried out based on the following principles: reliability, care, impartiality and rationality. The audit result is also strongly affected by competences of auditors, their personalities, knowledge as well as skills of audits performing [4-7].

2. AUDIT AS A TOOL OF ENTERPRISE DIAGNOSE AND IMPROVEMENT - ASSESSMENT

The enterprise subject to analysis is involved in production and provision of services related to the metallurgical sector. The basic sphere of metallurgical enterprise activity there are two fundamental areas: production a wide assortment of wire and products from wire and nails production in one of the widest ranges in the

world. This enterprise, willing to meet the market requirements and setting the customer interest as one of basic priorities, made a decision on implementing the following systems: Quality Management, meeting requirements of ISO 9001:2008 standard, Environmental Management, meeting requirements of ISO 14001:2004 standard, and Health and Safety at Work Management, meeting requirements of PN-N 18001:2004 standard.

For each of those areas (quality, environment, HSW), a number of targets have been set. The main of them include customer satisfaction and improving the products quality, reduction of emission and preventing the environmental pollution, as well as permanent improvement to the situation of health and safety at work. The process of enterprise strategic management and development proceeds in accordance with the PDCA cycle (Plan - Do - Check - Adjust)

The quality policy is defined and targets are developed and also measures are determined within the planning. The doing refers to undertaking the planned actions, audits are used to assess, whether the planned actions are properly carried out, while the adjustment is a direct outcome of audits and means taking relevant actions leading to implementation of previously planned objectives or to changing the planned objectives and development of new ones. The process of strategic management and development is strictly related to the concept of continuous improvement to satisfy customer requirements and expectations. Three types of processes, i.e. managing, main and supporting, contribute to achieving this objective. In the studied enterprise audits are performed covering all mentioned processes. Both internal and external audits are aimed at revealing incompatibilities and introducing recommendations and actions improving in individual systems, i.e. quality, HSW, and environmental protection. They also define the correctness of these systems implementing and maintaining as well as provide managers of individual plants, departments, sections with the information on its operation. Audits are aimed at obtaining confirmation that the operating systems have been effectively implemented, maintained and improved in accordance with planned activities. A specification of internal audits carried out in the studied metallurgical enterprise in the years 2011 - 2015 is presented in **Figure 1**.

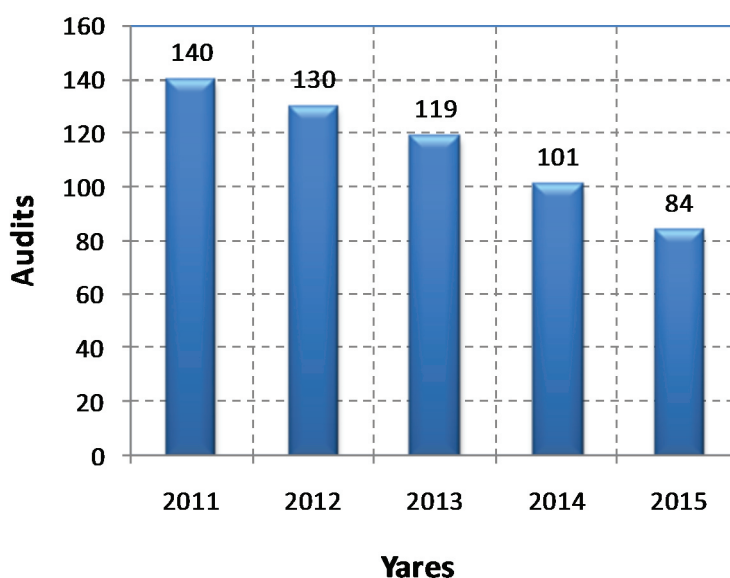


Figure 1 Internal audits performed in the studied metallurgical enterprise in the years 2011 - 2015

From the obtained data it results that the number of internal audits is declining, which results from recommendations being improving actions.

To carry out a detailed analysis of performed audits effects, in the further part of the paper results of carried out studies are presented for a selected study period, i.e. for the year of 2015. Performance of audits carried out in individual units of the metallurgical enterprise in 2015 is presented in **Figure 2**.

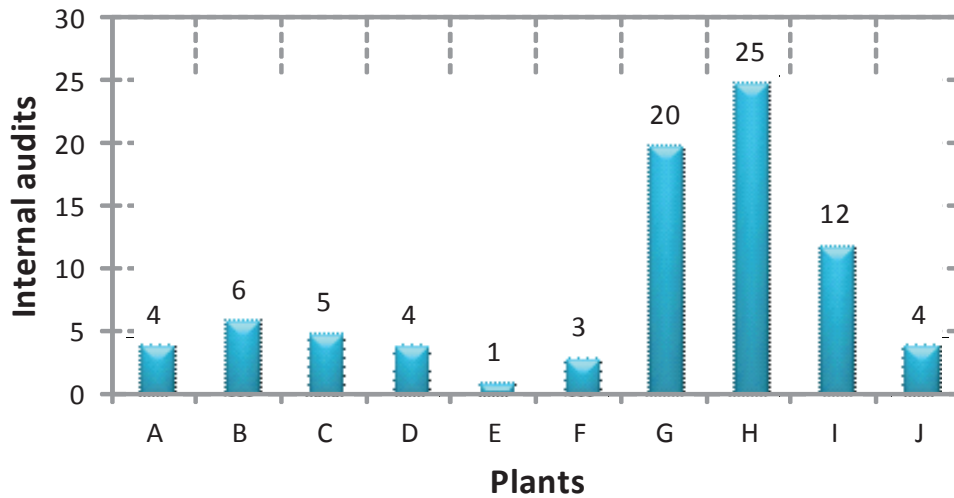


Figure 2 Internal audits carried out in the studied metallurgical enterprise in 2015 broken down into plants

Based on the obtained results it was possible to see that the greatest number of audits were carried out in plants directly related to products manufacturing. The performed audits resulted in revealing incompatibilities in individual systems (**Figure 3**).

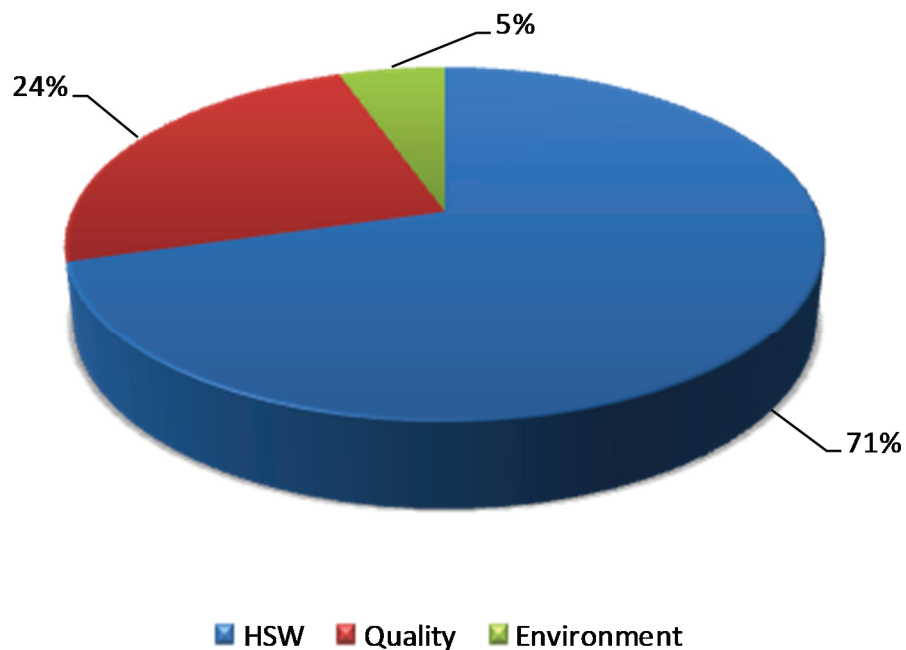


Figure 3 Incompatibilities revealed in 2015 in individual systems: HSW, Quality, Environment

The greatest group of incompatibilities was registered in the HSW system, because as many as 119, which made 71% of all originated incompatibilities. The human factor was the reason for these incompatibilities occurrence. **Figure 4** presents in a descending order the share of reasons in the total number of incompatibilities. The analysis carried out shows that only 1% of incompatibilities occurrence reasons refers to the environment. People, i.e. the company personnel, make the largest group of incompatibilities reasons (92%).

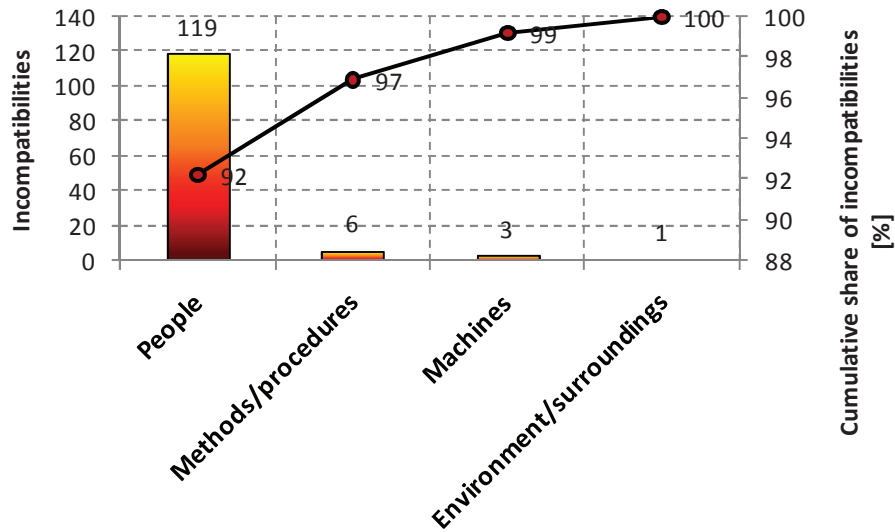


Figure 4 Share of incompatibilities revealed in individual systems in 2015

The number of incompatibilities occurred in individual organisational units in the studied period (2015) is presented in **Figure 5**.

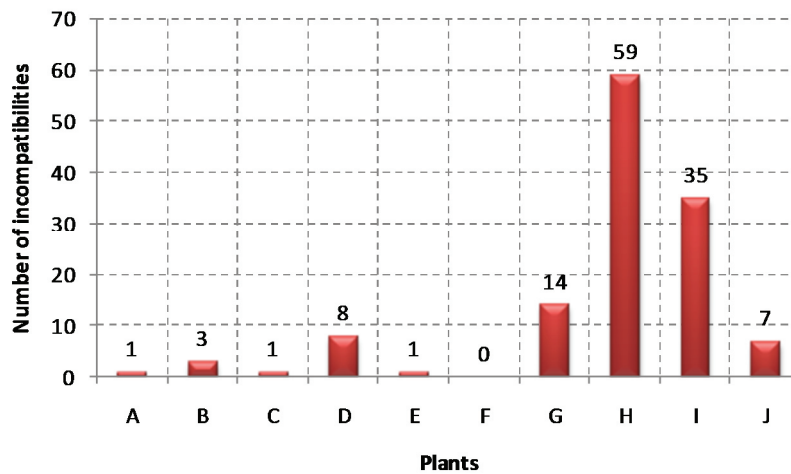


Figure 5 Number of revealed incompatibilities in the studied metallurgical enterprise in 2015 broken down to occurrence centres

Based on the performed audits it was shown, in which units the number of incompatibilities occurring was largest, these are units directly related to products manufacturing: H (drawing mill) - 59, I (zinc plant) - 35, G (workshop for pickling) - 14 incompatibilities, respectively.

Then the state of progress in removing the occurred incompatibilities was determined in the period taken for studies (year 2015). After carried out audits 97% of occurred incompatibilities were removed, while the removal of outstanding 3% is ongoing. In the studied period out of 136 recorded incompatibilities there was only one significant incompatibility, and 33 referred to observations.

The basis of improving actions start in the studied enterprise comprised incompatibilities or a probability of their occurrence. The number of improving actions in individual units of the company undertaken as a result of audits in 2015 is presented in **Figure 6**.

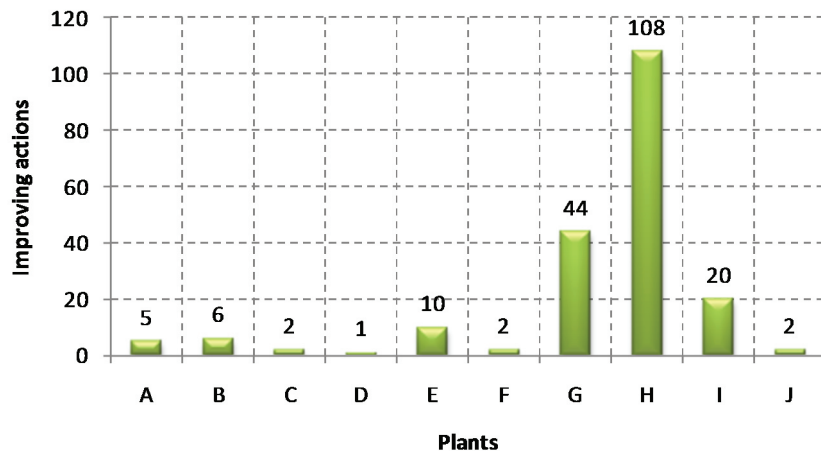


Figure 6 Number of improving actions in individual units of the enterprise in 2015

Out of 200 started improving actions 85% were completed, while 15% are still ongoing. The largest number of improving actions was carried out in three directly manufacturing plants: H - 108, G - 44, I - 20, respectively.

Types of improving actions in the studied enterprise may be divided into those, which are related to prevention, i.e. finding reasons and sources of potential incompatibilities origination so as to avoid their occurrence in the future, and into corrective actions related to incompatibilities origination. Types of improving actions in the studied enterprise in 2015 are presented in **Figure 7**.

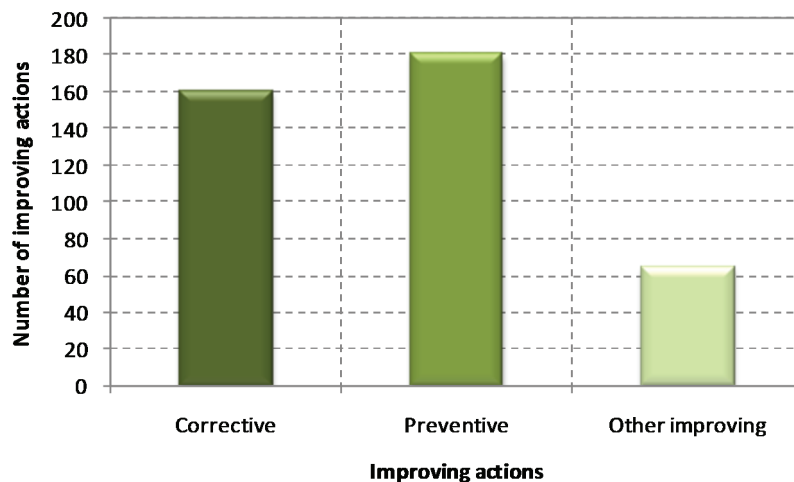


Figure 7 Types of improving actions carried out in the studied enterprise in 2015

The largest number of improving actions, because as many as 181, had a preventive nature, the number of corrective actions carried out was 161, while there were 65 other improving actions. The suggested actions were related mainly to elimination of incompatibilities caused by the human factor. To a large extent this referred to improving safety in the workplace as well as efficiency of operations in individual plants. Also the actions aimed at introduction of additional staff training in the field of raising their awareness of the individual position operation influence on the entire system operation were pretty important.

The presented way of monitoring the needs for improvement through the audit seems to be appropriate. Employees not only identify problems, but also already at a preliminary stage suggest certain changes, involving themselves in the process of improvement. To achieve such outcomes the company had to establish inter alia an additional motivation system, in which the employees' contribution to organisation improvement processes are appreciated.

3. EFFECTS OF ACTION IMPROVEMENT IN THE SELECTED ENTERPRISE

In order to determine the influence of lead audit on functioning the enterprise, it was made an evaluation of its. For the realization of this assessment initial data were acquired from the metallurgical enterprise. In first order was made an analysis of disagreements arising in a wire production process in drawing mill in the research period 2013 - 2015. On 10000 randomly chosen samples 8 groups of incompatibilities causes were identified (A1 - crack on the wire surface, A2 - tensile strength incompatible with the order, A3 - mechanical damage on the wire surface, A4 - the dimensional tolerance incompatible with the order, A5 - pouring water, A6 - inappropriate quality of the wire surface, A7 - lack of wire relief annealing, A8 - bar turning the wire surface). In **Figure 8** individual size of shares causes disagreements during the production of wire in 2013 and 2015 were presented.

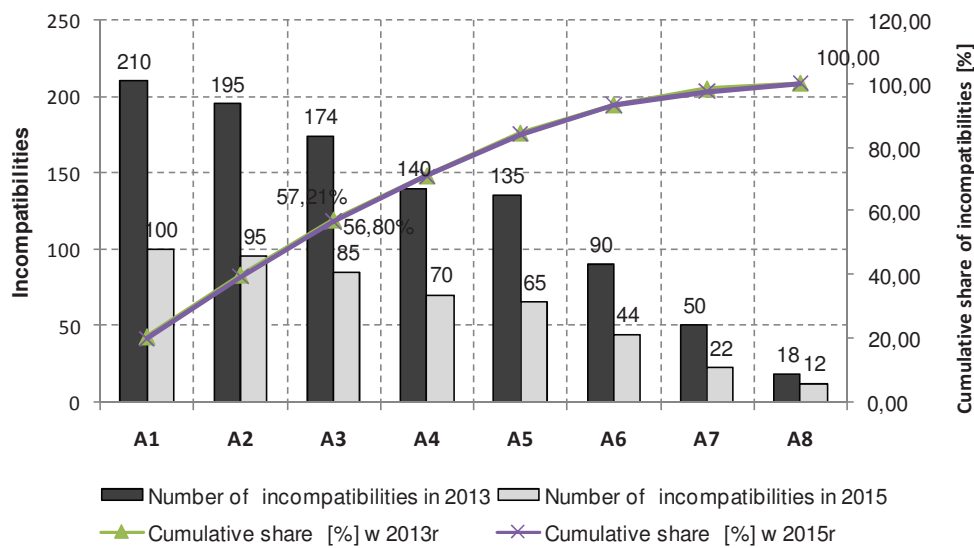


Figure 8 Pareto-Lorenz graph

Main conclusion after carrying out analysis of the disagreements structure with the help of Pareto-Lorenz diagram is that more than the half of not incompatible products (57%) that are presented in manufacturing processes in 2013 in the drawing mill department only three causes are responsible - mechanical problems (A1 - crack on the wire surface and A3 - mechanical damage on the wire surface) and material problems (A2 - tensile strength incompatible with the order). To 10000 samples in 2013 1012 was defective piece. Analysing disagreements in the products areas responsible for the problems were separated. To this purpose a diagram 5M was applied. According to this methodology, amongst causes that result problems 5 main elements were chosen: Manpower, Methods, Machinery, Materials and Management. For needs of this study a chosen element of 5M diagram was presented i.e. „Machinery”. In the case of this factor such areas were chosen: the age and the technical state of machines and the breakdown frequency. It is worthwhile emphasizing that a machines age used during the production was one of the main causes responsible for the disagreements. To this purpose the enterprise invested financial means in modernization and widening machines stock. At present in the company there is one of the newest technological lines for wire drawing made by KOCH Company. Audit also revealed the problems connected with the quality of delivered product. In this case was recommended before the production sending samples of wire rod to the laboratory or to change the wire rod supplier, appropriately to calibrate machines and tools for the measurement of the wire diameter used during the production. Additionally, as the important factor, was recognised vocational training and checking measurements correctness. Confirming recommended action through audit (correcting, preventive and improving) there was a fall in the number of the disagreements. In 2015 to 10000 taken samples 493 containing disagreements what mean that their number was reduced to the half. There was also recommended action in the scope of the industrial safety. From received data that the production (kilograms) in the accepted research

period developed on the level (2013 - 33921911, 2014 - 37506753, 2015 - 40795671). In years 2013 - 2014 occurred three accidents and in next year 2015 not a single one. It is worthwhile adding that any accidents were deadly. In the research period any occupational disease was also stated. The situation in terms of industrial safety conditions seems to be satisfying. Action of the enterprise head towards elimination of the risk and providing better conditions on workstations.

4. SUMMARY

Running a company nowadays, at a fierce competition, became a considerable challenge. Even the smallest organisational mistake may be extremely costly. The greater are possibilities of internal adaptation of the enterprise to the changing environment, the more real are chances of succeeding. Enterprises willing to ensure this success must pay more and more attention to improvement in all processes occurring in the enterprise. The carried out studies show that the studied enterprise has no doubts, whether it should improve itself. This is confirmed by carried out studies on the effects of performed audits. The adopted method of improvement through audit enabled not only to distinguish criteria, which should be improved, but also revealed to what extent such changes should be made. Now it is necessary to survive and develop in the situation of permanently changing environment, its conditions and needs. So it is necessary to introduce continuously improving actions in the field of organisation, management, motivation methods or problem solving methods, and also technology.

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