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РОЛЬ ВПРОВАДЖЕННЯ TOTAL QUALITY MANAGEMENT У ВИРОБНИЧИХ ЦІНАХ НА ЛІВІЙСЬКІЙ МЕТАЛУРГІЙНІЙ КОМПАНІЇ "LISCO"

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THE ROLE OF TOTAL QUALITY MANAGEMENT IMPLEMENTATION ON PRODUCTION RATES AT LIBYAN IRON & STEEL COMPANY "LISCO"

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Анотація. Лівійські виробничі компанії, такі як "Лівійська металургійна компанія" (LISCO), зіштовхуються з багатьма труднощами при впровадженні та підтримці відповідних систем управління якістю. TQM в даний час все ще нова концепція, яка зараз введена в LISCO з метою підвищення якості продуктивності. Їм також бракує знань про програми та підходи до управління загальною якістю (TQM). Крім того, ці аналізи можуть допомогти органам, що приймають рішення, зосередити увагу на сильних і слабких сторонах, пов'язаних із впровадженням систем якості. Це дослідження проводиться з метою визначення ролі, яку відіграє впровадження Total Quality Management (TQM) на продуктивність в Libyan Iron & Steel Company (LISCO). Дослідження було проведено в LISCO і на основі даних щодо виробничих ставок, наданих безпосередньо відділом виробничого планування. Для аналізу даних була схвалена описова статистика. Загальний результат показує, що практика TQM сприяє підвищенню продуктивності праці. Це показує позитивну взаємозв'язок між впровадженням TQM та продуктивністю. Підбиваючи підсумок, в даному документі використано деякі статистичні нариси при аналізі виробничих ставок в Лівійській металургійній компанії, з тим щоб отримати загальний огляд впровадження систем TQM та визначити відносну важливість продуктивності. Для досягнення мети цього дослідження було використано описовий аналітичний метод. Результати виявили, що виробництво підвищувало ставки після року першого застосування системи управління якістю.

Ключові слова: якість, контроль якості, загальне управління якістю (TQM), виробництво, виробництво компанії.

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Anotation. Libyan manufacturing companies such as Libyan Iron & Steel Company (LISCO) are struggling with many difficulties in implementing and maintaining a suitable quality management systems. TQM nowadays still a new concept which is now introduced in LISCO having the objectives of improving the quality of productivity. They are also lacking the knowledge of Total Quality Management (TQM) applications and approaches. In addition, these analyses can assist decision makers to focus on the strengths and weaknesses related to implementation of quality systems. This study is conducted to determine the role played by Total Quality Management (TQM) implementation on productivity in Libyan Iron & Steel Company (LISCO). The study was carried out at LISCO and based on production rates data, provided directly by production planning department. A descriptive statistics has been approved for data analysis. The overall result shows the TQM practices are contributing towards productivity. It reveals a positive relationship between implementing TQM and productivity. To summarise, this paper has used some of statistical sketches in the analysis of production rates in the Libyan Iron and Steel Company, in order to reach an overview about the implementation of TQM systems and determine the relative importance to the productivity. To achieve the aim of this investigation a descriptive analytical method was used. The finding revealed that the production raised rates followed the year of first application of a quality management system.

Key words; quality, quality control, total quality management (tqm), production, manufacturing companies.

Formulas: 0, fig.: 6, tabl.: 3, bibl.: 11

Stating the problem. Libyan manufacturing companies such as Libyan Iron & Steel Company (LISCO) are struggling with many difficulties in implementing and maintaining a suitable quality management systems. They are also lacking the knowledge of Total Quality Management (TQM) applications and approaches.

Analysis of recent research research and publication. The cost of quality became a considerable portion of the total production cost [2]. A study of Elmghadmi [4], has shown a positive relation of implementing TQM practices. Based on the study of Hokoma et al [5], the results show that the strategies applied by the executive management body towards implementation of the quality management techniques and methods are not effectively planned. The process of Quality management can be viewed from Quality Inspection, to Quality Control, to Quality Assurance then to the current Total Quality Management. Manufacturing companies are required to adopt the TQM approach to keep them in a high competition status [6].

In a study made by Alsaid, and Rezik [2], it was found that the actual implementation level of TQM practices in LISCO in Misurata is at modest level. However, Hokoma et al [5], have found that senior managers in the LISCO, are willing to improve their business areas through applying the latest quality and manufacturing management systems, in order to achieve a high level of improvements. The implementation level of the TQM practices in the Libyan cement industry is found slightly more than in the iron and steel industry including LISCO [3]. Another study has indicated that political and cultural factors, have a negative influence on TQM implementation in the country [8].

The company is facing a great challenges of its existence of maintaining recognised brand standards, as well as keeping LISCO in the top list of quality in the country, especially with the growing

concerns and demands from various players in the market. There are only few researches on TQM applications in LISCO, further works are desperately required to identify the problem.

Setting objectives. Research the role of total quality management implementation on production rates at Libyan Iron & Steel company «LISCO».

Research results. LISCO has adopted a clear vision to apply quality procedures which has led to different levels of quality awards and certifications such as ISO. LISCO's quality management system is based on the process approach in order to fulfil the international standard ISO 9001:2000 requirements. The quality control department has a clear links with other different departments within the company as described in figure1. The model was installed to ensure flexible information system exchanges between related departments to the process of production.

However, a proper icons have been added to the model to enhance quality efficiency by upgrading more effective aspects of TQM practices which are vital for company performance. These parts are; Research & Development, Technical Department, and Maintenance.

The inter-action among the processes of the quality management system is illustrated in the model; shown in figure 2. Concluded that, the flow of management processes including all activities to achieve the final product regarding customer satisfaction.

For TQM successful implementation, a suitable TQM framework for Libya's culture and political issues as an external factors are added which are believed to have a vital impact to the TQM success.

Since political factors play an important role, TQM implementation in LISCO is at modest level [8]. During the recent years, the company undergoes many difficulties due to administrative and operational problems.

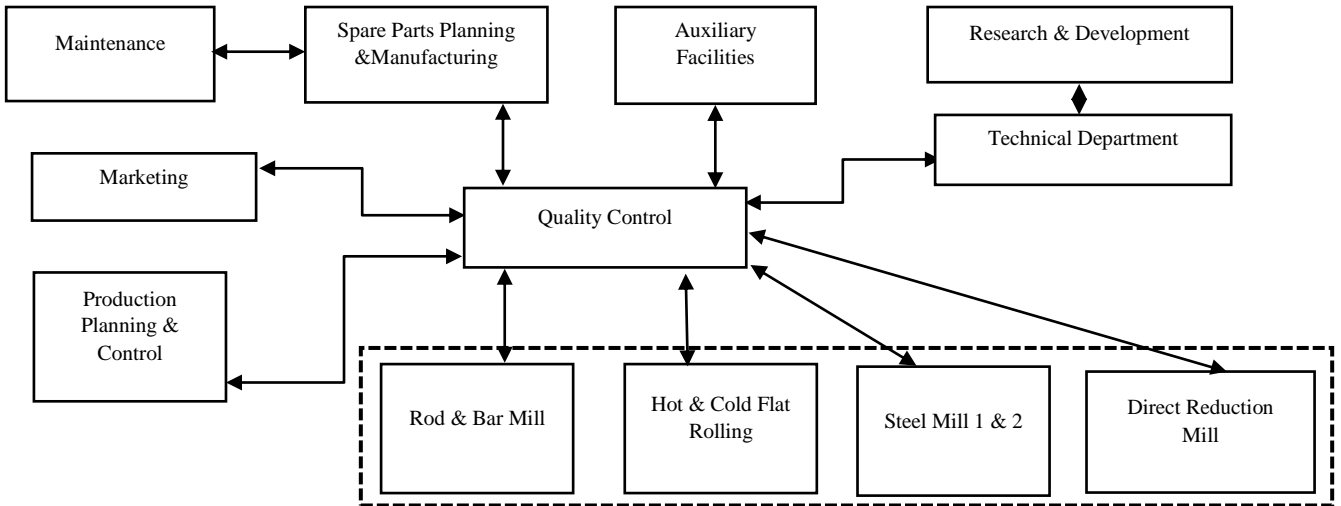


Figure 1. Links between quality department and other departments in LISCO

Source: compiled by author [10]

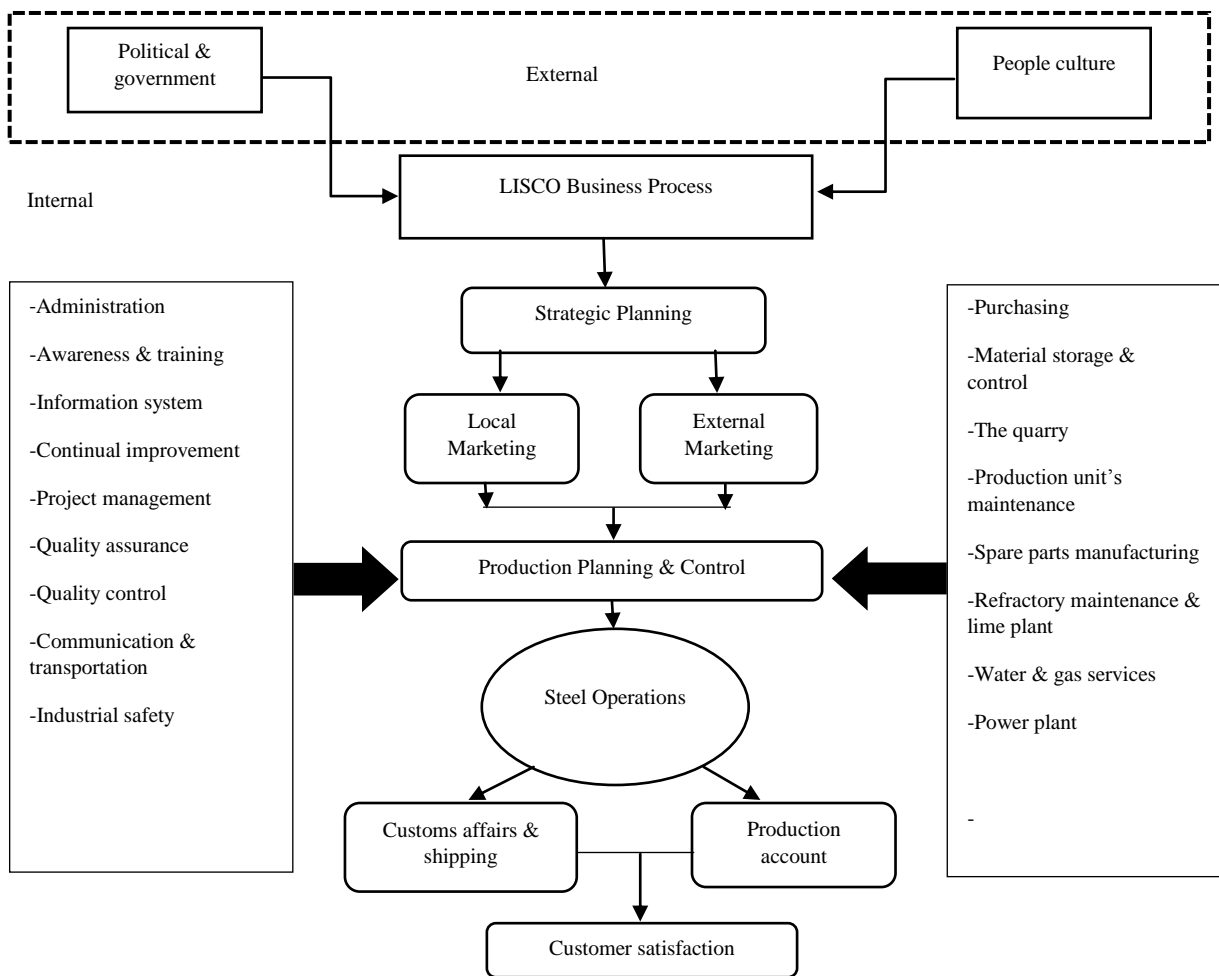


Figure 2. The inter-action model of the quality management system

Source: compiled by author [10]

LISCO's quality policy is provided to comply with relevant requirements and its products quality with customer's requirements, needs and expectations to

secure its leading position among iron and steel producing companies by establishing and reviewing periodically its quality objectives. It consists the following steps [10], which are illustrated in figure 3:

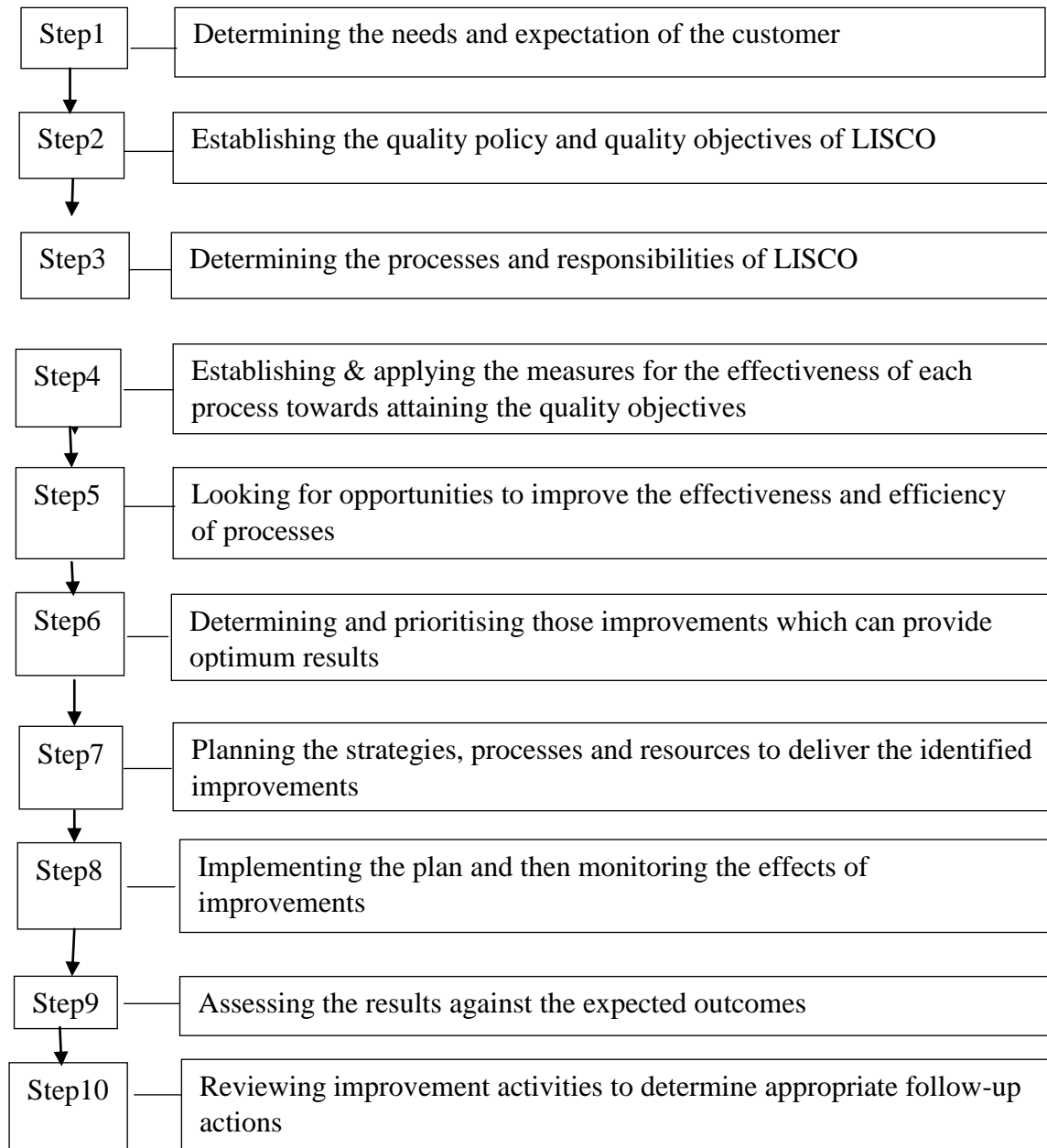


Figure 3. Quality Procedures in LISCO

Source: prepared by author

TQM is still a new concept which is now introduced in LISCO having the objectives of improving the quality of productivity.

The Company comprises of the following production plants: Direct

Reduction Plants, Steel Melt Shops, Bar-Rod- and Section Mills, Hot and Cold Rolling Mills, and Pickling- Tempering- Galvanizing Lines.

Table1 shows production rates for years from 2000 to 2017 just before, during and after the application of quality systems

towards to the overall quality system (TQM).

The yearly quantities produced by LISCO in the last 17 years in tons unit are shown in table1:

Table 1

Production achievement; 2000 - 7/2017 made by author.

Year	DR Plant		SMS Plant		Long Products	Hot Roll Plant		Cold Roll Plant			
	DRI	HBI	SMS1	SMS2		HSM	HSL	Pickling	CRM	TEMP	GAL
2000	1,047.20	455.4	632.1	422.8	553.8	403.55	37.1	89.129	44.946	22,689	31.287
2001	727.3	364.44	486.3	359.5	438.23	322.38	29.855	57.869	28.727	16.962	29.291
2002	738.6	431	444.3	444	406.76	408.8	39.777	45.853	35.87	17.275	28.9
2003	923.8	412.33	505.4	501	443.59	391.33	45.02	69.026	55.608	27.662	27.007
2004	976.8	606.7	544	482.4	488.8	428.81	36.8	64.036	50.189	25.266	18.535
2005	1,096.35	554.26	705	550.4	672.24	499.53	34.752	53.252	46.38	26.85	17.125
2006	1,069.85	563.1	530.5	620.1	505.4	564.75	40.706	81.494	67.885	48.688	9.28
2007	1,244.30	395	542.8	671.4	578.48	596.3	33.421	105.512	92.086	56.661	26.9
2008	1,064.50	504.88	603.8	533	606.615	480.43	41.807	95.182	82.36	63.141	17.187
2009	875.1	233.8	469.6	452	576.95	426.85	21.902	110.968	101.53	56.741	35.292
2010	754.8	516.86	259.8	509.7	503.146	465.26	37.114	94.583	93.998	63.864	20.671
2011	198.5	107.43	106.2	93.86	105.363	83.193	5.187	15.176	14.399	7.002	10.218
2012	266.67	241	223.6	91.43	292.516	70,536	10.521	11.131	11.345	8.443	0
2013	657.8	300	452.6	260.3	530.748	227	15.38	37.157	36.945	38.04	0
2014	714.2	280.57	481.3	220.2	467.3	203.66	15.114	35.552	35.521	29.748	0
2015	366.8	83.2	224.6	127.2	308.185	99,798	13.904	36.341	34.645	22.178	393
2016	555.4	143.45	367.6	124	406.5	133.63	12.564	27.982	28.839	16	2.132
JUL/ 2017	210.1	63	146.75	80.36	168.174	67,282	1.681	13.066	12.724	4.077	0

Source: data collected from production department and constructed by author

These data will enable a flexible description and analysis over these years, as well as to point up the different levels of production

rates. For more simplification, table2 has been made to expose the total production summation in tons for each year in table1.

Table 2

Total production summation for each year

Y	2000	2001	2002	2003	2004	2005	2006	2007	2008
Σ	3,686.03	2,831.56	3,012.44	3,374.87	3,703.80	4,239.01	4,092.47	3,773.16	4,075.72
Y	2009	2010	2011	2012	2013	2014	2015	2016	Jul-17
Σ	3325.44	3299.13	736.31	1227.29	2556.17	2483.17	1316.85	1816.17	767.314

Source: prepared by author based on table1

Gathering the production together for each year of the total of all process's plants can ease the reflection of productivity regarding TQM implementation in coming column chart in figure 4.

A common statistical graphic methods were used to expose these data in table2 for each year in figure 4. It is clear from figure 4; the rise in production rates with the following years of the beginnings of ISO quality systems application in 2002, and then attempt to develop a comprehensive quality system such as (TQM), taking into account the

existence of many obstacles, especially, culture of absorbing TQM [9], and how to apply it as well as change resisting.

Figure 4, shows a fluctuation in production for example, the company's production rates began to rise until it reached the highest value in the year 2005, and then began to decline until it reached its lowest value during the year 2011, which coincided with the regional uprising events, and then began to rise again in 2013 after the state recovery. Also, the company was slightly affected by the global financial crisis, during the year 2009, as shown in Figure 4.

Nevertheless; in 2013, 2014, and 2015 the production rates started to rise up again gradually before declining again because of insufficient power supply on the following years as well as the political tensions in this period of time.

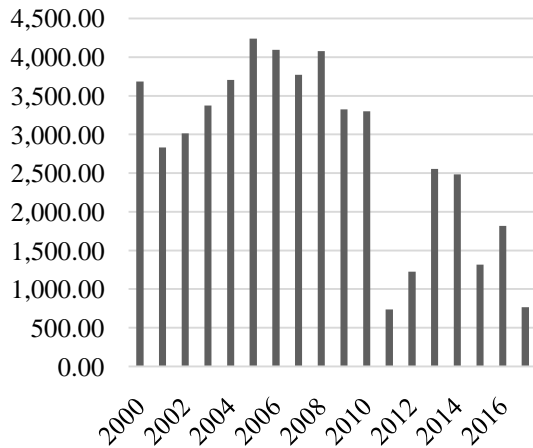


Figure 4. Representing the total production data from table 2

Source: made by author based on table 2

For a simplified explanation we would expose the productivity of the primary main factories in LISCO which are the base for the next production stages in figure 5.

From figure 5, it can be observed that the relationship between production rates and quality management systems implementation were clear to show a positive impact in the increase in total production. Noticing that, years later the implementation of quality systems, there were a clear output fluctuation on production rates due to several reasons as mentioned previously.

These difficulties are causing a negative impact on the organization's productivity [1]. It's quite obvious that applying a modern quality management system has made a tremendous impact on productivity [6], however, to overcome any exceptional circumstances, a quality discussion circles is advised to point the problem and set a suitable solution.

The company has obtained the first certificate of quality management system (ISO 9001:2000) in the year 2002, and is still going on the implementation of internal audit to monitor its performance, and continuous

improvement approach is an effort to reach the top rank of the total quality [11].

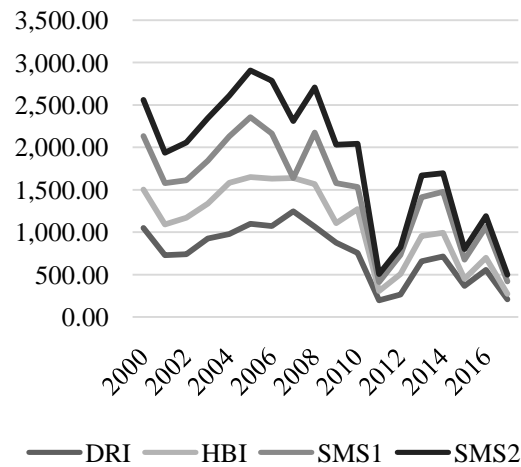


Figure 5. Productivity in tons per year of main factories

Source: made by author

ISO certificate applied in the field of quality, environment and general safety: 1 – ISO Certificate (ISO9001) for quality system. 2 - ISO Certificate (ISO14001) for environment Management System. 3 - ISO Certificate (ISO18001) for safety system.

Due to the company's commitment to satisfy customers by considering quality as one of its vital goals, the company has established the quality council aiming to fulfil the requirements of the international quality system (ISO) in all production trends. As a result, LISCO has been awarded the 12th European Award of quality for the year 1998, and the International Quality Certificate; (ISO 9001/2000) in 2002 [1]. From previous studies; there are many barriers prevent the company to implement TQM successfully such as: lack of top management commitment, poor vision and plan statement, the government influences, lack of TQM knowledge, employees involvement, financial support, as well as people culture [7, 8, 9]. Since TQM is a new philosophy of modern quality management system, therefore; there is a challenging approach to be installed and applied [6]. Unlikely, LISCO is characterised by good quality specifications, good grade of raw material, and up to date processing equipment with more skilled workers and experienced managers due to continuous

training and education. However, managers in LISCO are keen to apply the most recent systems to achieve a high quality level in process and production, but the implementation of these kinds of systems are still struggling [7]. The years of high productivity which resulted from improved quality, made their impact on sales in LISCO as illustrated on table 3.

Table 3

Sales achievement per tons; 2008 - 2015

Year	Long products	Hot roll products	Cold roll products	Galvanised products
2008	819228	88650	60626	17760
2009	806881	126153	67918	33567
2010	569832	142531	60534	25760
2011	103142	21059	3435	5398
2012	252820	77199	18525	6628
2013	511202	120203	37910	1881
2014	473251	95848	29241	2091
2015	347142	133540	34582	3268

Source: data collected from marketing department in LISCO made by author

Data in table 3, which were collected from marketing department in LISCO, present indirect indication of improving quality after TQM implementation. Figure 6, gives a clearer picture of the previous data in table 3, regardless declining in 2011 due to country's instability as explained earlier.

Unexpected events often affect the different activities in LISCO behind the quality plans. In such case applying and manipulating quality management systems become out of control.

Conclusions. This paper has used a descriptive statistical method in the analysis of production rates in LISCO, in order to investigate the implementation of TQM system and determine the relative importance to the productivity. In addition, these analyses can assist decision makers to focus on the strengths and weaknesses related to implementation of quality systems.

The findings revealed that the high rates of production started at the application of a quality management system. Finally, installing modern quality management systems is approved to enhance the organizational performance for any manufacturing company; LISCO for instance. Senior managers need to take an action in order to achieve an effective and successful

implementation of TQM techniques and methods.

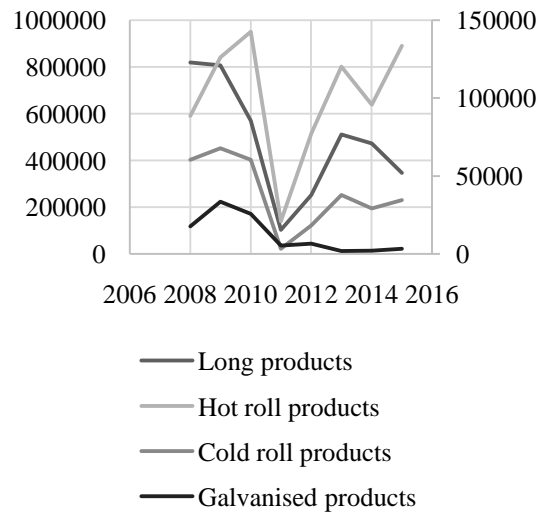


Figure 6. Printing the sales on table2 per tons over years for steel products

Source: made by author based on table 3

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