

# Improving Process Quality by 5s Tool in a Handling Company: Case Study

Solomani Coulibaly, Sidiki Tibina Koné

**Abstract** – To get advantage in an increasingly intense competition, companies have to satisfy their customers by offering them a service or product of quality. An unorganized work-station, uncomfortable working environment and the excessive wastes in the company are some reasons to lost competitiveness facing to concurrence. To face these challenges “Handling Co” was undertaking a project by introducing the 5S practice into their business. The present research case study reports the 5S practice experience from “Handling Co”. The results show that, the 5S practice improves productivity, efficiency, customers’ satisfaction of the company. Three month of 5S implementation show that productivity, efficiency and customer satisfaction have progressed from 51.5% to 75.0%. However, a greater involvement from top management and a rigorous following are absolutely necessary for the success of the 5S implementation.

**Keywords:** 5S, 5S Practice, 5S project, Process Quality

## I. INTRODUCTION

In today globalized market competition between organizations is increasingly intense. Customers become more and more exigent. Cost, quality and delivery time are the leitmotiv of majority of customers. Considering this triptych and to remain competitive, organizations have to invest by searching for sustainable advantages. To this triptych, Stevenson (2009) [1] thinks that customization and delivery reliability are some of the major competitive dimensions that form the competitive position of a company. 5S is one of the meaningful tools, among the plenty of quality tools to get competitive advantage. The 5S is the acronym of five Japanese words which stands for *Seiri* (sort), *Seiton* (set in order), *Seiso* (shining), *Seiketsu* (standardize) and *Shitsuke* (sustain) [2]. However, differents translations of these Japanese words in English have been used in the literature by different authors [3-4]. After its emergence implementing 5S practices in different sectors of industries have been broadly used. Mohd et al (2010) [5] find that implementing 5S techniques could considerably improve productivity, efficiency, environmental performance, health and safety standards in their workplace. Osada (1991) [6] considers that 5S implementation is valuable practice for everyday life; likewise the activities in any workplaces environment could be significantly improved. O’h Eocha (2000) [7] finds rather housekeeping, environmental performance, as well as safety standards in a systematic way are some factors that can be improved by 5S techniques. Furthermore, Warwood and Knowles (2004) [4] stated that most Japanese companies

claimed that the 5S benefit is not only for improving their physical environment, but also improving their thinking processes as well.

We note then many authors have been reported their 5S practice experiences in industries. Recently, others success stories of 5S implementation case study have been reported in different economics sectors such as: manufacturing companies [8]-[9], small scale industry [2]. Therefore, there is no doubt that implement 5S can enhance company profitability. But, any meaningful study about 5S implementation in handling company is available.

This study is to address this luck by concentrating on the case study carried out as part of a project to implement the 5S practice in a handling company, by developing and evaluating a checklist audit. In spite of the difficulties encountered by conducting this project, the study was successfully completed. The present article is presented as follows: after a brief introduction of the company where the study was carried out, we discuss the research methodology used to getting the relevant information; the last part presents the founding of the study then gave some keys factors to successfully implement 5S practice at the company.

## II. COMPANY PRESENTATION

To keep confidentially, the name of the company has not been voluntary disclosed and designated by “Handling Co”. Handling Co is an international company that has a Malian affiliate established in Bamako since 1964. It is an affiliated company to the France world class group based in Bordeaux that have twelve companies in West Africa. Handling Co’s main activity is the maintenance of systems and components of heavy’s engines. Its main customers are local mining groups, public buildings and works sector, energy sector. Therefore, the company held well known brands equipments like:

- *Caterpillar*: mining materials, public buildings and works, generating sets.
- *Olympian*: generating sets.
- *Hyster*: handling materials.
- *Atlas copco*: mining materials.
- *Perkins*: engines.

To satisfy its main customers Handling Co established several workshops as shown in the company’s uncompleted flowchart (figure 1).

Manuscript published on 30 April 2016.

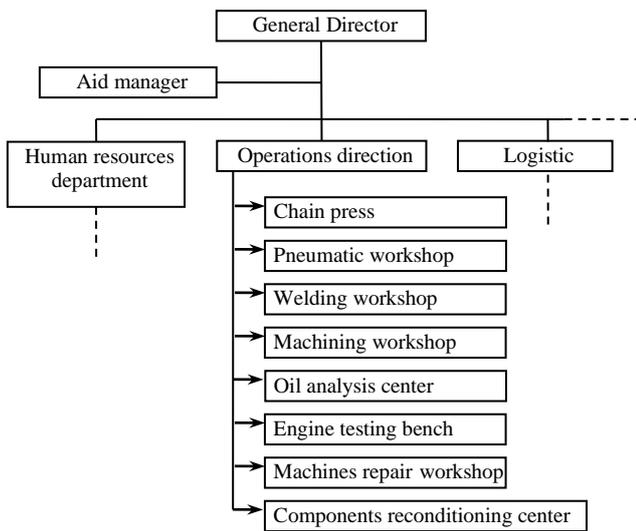
\* Correspondence Author (s)

**Solomani Coulibaly\***, Departement Génie Industriel, Ecole Nationale d’Ingénieurs – Abderhamane Baba Touré (ENI-ABT), Bamako, Republic.

**Sidiki Tibina Koné**, Mechanical Engineer at Handling Co, Components Reconditioning Center, Bamako, Republic.

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](https://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC-BY-NC-ND license <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

# Improving Process Quality by 5s Tool in a Handling Company: Case Study



**Figure 1: Handling Co partial flowchart**

Recently Handling Co undertakes implementing continuously improvement quality tools to augment their share of market; knowing that this kind of project has a great impact on its business plans. Using quality tools allows achieving high quality of product and service by reducing waste, optimizing productivity, efficiency and profitability of the company.

### III. PROBLEM STATEMENT

In today globalized market, where business competition is fierce, organizations, to stay competitive, have to loyal their customers by offering them a product or service of quality. Imagine an enterprise where the workers have to run from a workshop to workshop for hunting down required objects (tools, materials ...), where the floor is oil or others products spotted, where machines are dirty, where cartons and palettes loiter in the workshop where rebuses accumulate. Indeed, the obsolesces practices, the wastage, the luck of formation, the luck of team spirit, unorganized work-station, uncomfortable working environment are so much reason that brake the process stability to trend toward continuous improvement. The 5S method is a best way to address these insufficiencies. This is one of the reasons why *Handling Co* was undertaking a project by introducing the 5S practice into their Components Reconditioning Center (CRC). Although *Handling Co* is a certified company for standards like: ISO 9001-2008 for quality management system; ISO 14001-2004 for environmental management system and OHSAS 18001 for occupational health and safety management system. Thus, it could be questioned: what is the challenge of implementing the 5S method in such company?

### IV. MATERIAL AND METHODS

The present research is a case study that analyzes the audit results of 5S implementation process in a Handling Co. Implementation of 5S consists to systematically apply the define rules by linking five activities: 1S : sort, 2S: set in order, 3S: shining, 4S: standardize, 5S: sustain. For that, a 5S team was established. The team manager has to coordinate the 5S activities and transmits the feedback and the state of

evolution to the top manager about the encountered difficulties.

In this kind of study one of the main difficulties is to establish a suitable and reliable checklist to collect right information about the core problem. The collected one should provide meaningful information about the actual problem to be addressed. Information from respondents is then analyzed to take necessary disposition. For that, we adapt to our case the well established checklist based on all 5S requirements developed by “creative safety supply” [10] (appendix 1). It was necessary to have a greater involvement from top management to get successful chance of the 5S project. Implementation steps of the 5S project are enumerated as follows:

- At first, we conducted the audit process of the current state of Components Reconditioning Center by using the audit checklist, 5S evaluation and camera (for shooting pictures before 5S implementation).
- Analyzing the checklist record.
- Taking correctives measurements and defining goal.
- Implementing the all 5S requirements (1: Sort, 2: Set in order, 3: Shining, 4: Standardize, 5: Sustain).
- Three months later, we renewed the audit process after 5S implementation, by using the same tools.
- Taking new improvement measurements and defining a new goal.

In this study, the 5S scoring guideline [10] presented in appendix 2 is used to determine the 5S practice level. Eight questions are asked for each “S” in the checklist. Each question is scored from 0 (no effort for 5S practice) to 5 (highest effort for 5S practice). The results are compiled in an Excel fold to calculate the average score and then converted into percentage values as showed in table 1. The more the percentage values are high the more the company productivity is elevated and the more company customers are satisfied.

**Tableau 1: Ranking model**

Scale of marking (%)	Implementation's level
91-100	Excellent
81-90	Very good
71-80	Good
61-70	Good enough
51-60	Moderate
0-50	Weak

### V. RESULTS AND DISCUSSIONS

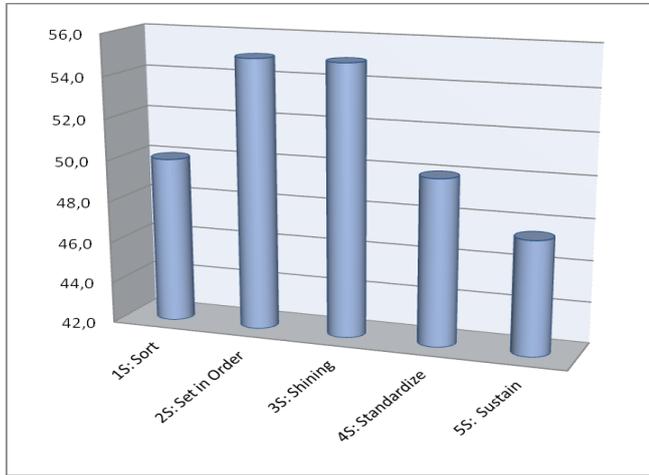
#### A. Before 5S implementation

The before 5S implementation results are shown in the table 2 and plotted by Microsoft Excel in the figure 1. By analyzing these results, we note that 5S practice overall were in *moderate level* (51.5%). But, taking individually, only the 2S and 3S were moderate; the others were in weak level. This is not a surprising result, because Handling Co, before 5S introduction, was already certified ISO 9001-2008, ISO 14001-2004 and OHSAS 18001. Somehow, these certifications rhyme with 5S practice.



**Tableau 2: Score evaluation**

	Sort	Set in order	Shine	Standardize	Sustain	Total
Total Score: T	20	22	22	20	19	103
Total of questions: n	8	8	8	8	8	40
Average Score A= T/n	2.5	2.9	2,8	2.5	2.4	2.6
<b>Percentage %:</b> <b>A*100/5</b>	<b>50.0</b>	<b>55.0</b>	<b>55.0</b>	<b>50.0</b>	<b>47.5</b>	<b>51.5</b>



**Figure 2 : CRC Initial state evaluation results**

**B. Correctives measurements**

Tacking the correctives measurements allow to define the next objective. The correctives measurements are consigned in the next table (table 3)

**Tableau 3: Planning of correctives measurements**

Possible improvements			
Activities	Dead line	Responsible	Status
All unnecessary materials, equipment, tools, paperwork, and furniture have to be eliminated of the workplace.	Dec. 31, 2015	Team 5S and operators	Finished
Clearly identified, labeled and well localized all materials, equipment, tools, paperwork, and furniture in the workplace.	Dec. 31, 2015	Team 5S and operators	Finished
Shelves, tools, work surfaces, floors, and walls are cleaned and painted. The cleaning means are provided where they not exist.	Dec. 31, 2015	Team 5S and operators	Finished
Systematically stored adequately work tools, pieces, documents after use. Make sure the work environment encourage the workforce to enhance the productivity.	Dec. 31, 2015	Team 5S and operators	Finished
Unexploited workplaces are eliminated. Initiatives taken by the 5S project responsible are endorsed by company's top managers.	Dec. 31, 2015	Team 5S and operators	Finished

The objective of the application of these correctives measurements is to reach at least 70% level at the next audit.

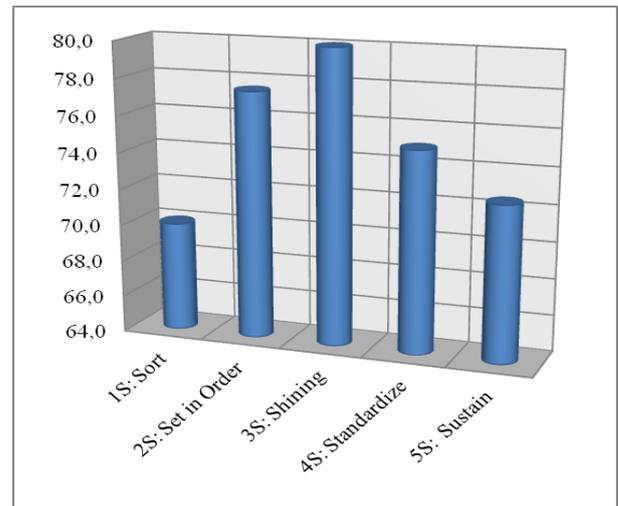
**C. After implementation**

Three months later, an audit process has been conducted to evaluate the new state by using the same checklist as

previously. The new evaluation leads to a *good level* (75.0%) as showed in the table 4 and plotted in figure 3.

**Tableau 4: Score evaluation**

	Sort	Set in order	Shine	Standardize	Sustain	Total
Total Score: T	28	31	32	30	29	<b>150</b>
Total of questions: n	8	8	8	8	8	<b>40</b>
Average Score A= T/n	<b>3.5</b>	<b>3.9</b>	<b>4.0</b>	<b>3,8</b>	<b>3.6</b>	<b>3.8</b>
<b>Percentage %:</b> <b>A*100/5</b>	<b>70.0</b>	<b>77.5</b>	<b>80.0</b>	<b>75.0</b>	<b>72.5</b>	<b>75.0</b>



**Figure 3: CRC result after three months 5S implementation.**

**D. News correctives measurements**

**Tableau 5: New Road map of improvement**

Possible improvements			
Activities	Dead line	Responsible	Status
Remake the tracing of paths and storage area with appropriate colors	March. 31, 2016	Team 5S and operators	Ongoing
Make involve the maintenance technicians in 5S principles.	March. 31, 2016	Team 5S and technicians	Ongoing
Fixed standards of cleanliness according to work areas and make respect these standards.	March. 31, 2016	Team 5S and technicians	Ongoing
Standardized the boxes, shelves, containers, etc. identification.	March. 31, 2016	Team 5S	Ongoing
Instituted a 5S practices award in the company.	March. 31, 2016	Team 5S and top managers	Ongoing

With this new road map and without degraded the last level, it can be expected in least at 85% level.

**VI. CONCLUSIONS**

The 5S is rather a philosophy and organization culture than an exact science that leads companies to a continuous improvement of product and service quality. But its implementation is not without difficulties.



# Improving Process Quality by 5s Tool in a Handling Company: Case Study

Beyond the result (from 51.5 % to 75.0%) the study revealed that some conditions are needed to implement successfully a 5S project. José et al. (2010) [4] find that – investment in 5S training for top management and workforce; top management commitment to the 5S practice; the 5S practice is included in the organizational strategic planning; the organization is focused on how to keep the 5S practice going; the organization measures the positive impact of the 5S implementation in the organizational culture; the 5S practice is used as the basis for advanced quality and continuous improvement philosophies; and the organization measures the benefits from 5S implementation such as quality improvement – are some of the keys factors to successfully implement the 5S project.

The present study corroborates the finding of José et al. Indeed, on the implementation phases, we realized that a greater involvement of the top managers is needed to guarantee the success of the project. Furthermore, efficient training is needed to stimulate the 5S practice in the day to day workforce’s habits. Finally, a rigorous following should be performed to sustain acquired results and continuously improving the company’s service quality.

## ACKNOWLEDGMENT

We are grateful to the Handling Co for their availability and support to this research.

## REFERENCES

1. Stevenson, W.J., 2009. Operations management. 10th ed. Boston, MA: McGraw-Hill.
2. R. S. Agrahari, P.A. Dangle, K.V.Chandratre, 2015. Implementation of 5S Methodology in the Small Scale Industry: A Case Study. International journal of scientific & technology research Vol 4, Issue 04: 180-187. ISSN 2277-8616.
3. José H. Ablanado-Rosas, Bahram Alidaee, Juan Carlos Moreno and Javier Urbina, 2010. Quality improvement supported by the 5S, an

- empirical case study of Mexican organizations. International Journal of Production Research Vol. 48, No. 23, 1, 7063–7087.
4. Warwood, S.F. and Knowles, G., 2004. An investigation into Japanese 5-S practice in UK industry. The TQM Magazine, 16 (5), 347–353.
5. Mohd Nizam Ab Rahman, Nor Kamaliana Khamis, Rosmaizura Mohd Zain, Baba Md Deros and Wan Hasrulnizam Wan Mahmood, 2010. Implementation of 5S practices in The Manufacturing Companies: A case study. American Journal of Applied Science 7(8): 1182-1189.
6. Osada, T., 1991. The 5S’s: five keys to a total quality environment. Tokyo: Asian Productivity Organization.
7. O’heocha, M., 2000. A study of the influence of company culture, communications and employee attitudes on the use of 5Ss for environmental management at Cooke Brothers Ltd. TQM Magazine. 12: 321-330. DOI: 10.1108/09544780010341923
8. Vibhor Kakkar, Vijay Singh Dalal, Vineet Choraria, Ashish S. Pareta, Anmol Bhatia, 2015. Implementation of 5S Quality Tool in Manufacturing Company: A Case Study. International journal of scientific & technology research Vol. 4, Issue 02: 208-213. ISSN 2277-8616.
9. Shraddha P. Deshpande, Vipul V. Damle, Merang L. Patel, Akshay B. Kholamkar, 2015. Implementation of ‘5S’ technique in a manufacturing organization: A case study. International Journal of Research in Engineering and Technology Volume: 04 Issue: 01: 136-148. eISSN: 2319-1163; pISSN: 2321-7308.
10. Creative safety supply <https://www.creativesafetysupply.com/5s-audit-scorecard/>



**Dr. Solomani Coulibaly** is currently an associate Professor and chef of Mechanical Engineering option of Industrial Engineering Department at the National School of Engineering of Bamako – Mali. He received his PhD degree from the Department of Information Management and Decision Science at the University of Science and Technology of China (USTC) in 2005.

His research interests include quality tools integrated manufacturing systems.



**Sidiki Tibina Koné** is a Mechanical Engineer working at Handling Co as quality responsible. He is 5S team manager at Handling Co 5S project. He got his degree in Industrial Engineering Department from the National School of Engineering in 2015, Bamako, and Republic.

## APPENDIX 1: 5S Audit checklist

### 5S Audit checklist

1S: SORT ACTIVITY DESCRIPTIONS		SCORE
1	All useless things are removed from the workstation.	
2	Not required tools to make the current product are removed from the workplace.	
3	Rarely used objects are durably placed near the work area.	
4	Documents in workstation are missing or out of date.	
5	Unused machines or equipments exist in the workstation.	
6	Elements of last work still are in the workstation.	
7	Passed or ongoing inventory include useless pieces.	
8	Tripping dangers such as electrical cables, etc. are removed from standing/walking areas.	
2S: SET IN ORDER ACTIVITY DESCRIPTIONS		SCORE
1	Access, storage locations, workplace and equipments locations etc. are clearly defined.	
2	The arrangement of containers, cabinets, boxes, desktops, etc. are well adapted	
3	Tools and instruments are stored in a specific location at appropriate heights, so that the missing one is easily identified	
4	Machines and equipments are well arranged and clearly identified.	
5	The personal protective equipments are clearly labeled.	



6	Indications and security consigns are displayed and complete	
7	Access to fire hoses, fire extinguishers and other emergency equipment are free.	
8	Walkways and vehicle paths are clearly identified and unobstructed. Exits are clearly labeled and unobstructed.	
<b>3S: SHINE ACTIVITY DESCRIPTIONS</b>		<b>SCORE</b>
1	All containers, cabinets, boxes, desktops, etc. are kept clean	
2	All tools are kept clean and in good working order	
3	Machines and equipments are regularly cleaned	
4	Floors, walls, work surfaces are cleaned and painted	
5	Machines and equipments inspection is combined with the maintenance	
6	There is a responsible to supervise the cleaning operations	
7	All cleaning equipment is neatly stored and is readily available when needed.	
8	Operators do cleaning spontaneously	
<b>4S: STANDARDIZE ACTIVITY DESCRIPTIONS</b>		<b>SCORE</b>
1	Cleaning rules are clearly defined	
2	There is a procedure of dysfunctions identification.	
3	Equipment maintenance records and schedule are clearly visible	
4	There is maintenance of the three first S and a checklist of 5S tasks (daily, weekly, monthly)	
5	Security rules in the workplace are clearly defined	
6	Propositions for improvement are regularly generated	
7	Procedures are clearly written and used	
8	Stake of the procedures is clearly integrated in the progress plan	
<b>5S: SUSTAIN ACTIVITY DESCRIPTIONS</b>		<b>SCORE</b>
1	Daily cleaning operations are applied.	
2	Recognition is given to teams who get involved in 5S activities.	
3	Continuous improvement is integrated in the organization culture.	
4	Team members meet according to an established planning.	
5	Stocks control is integrated to the procedures	
6	Procedures are regularly updated and adapted	
7	Dashboard are regularly updated	
8	All team members are assigned 5S activities to be completed at least once/week.	

#### APPENDIX 2: 5S Scoring Guidelines

SCORE	CATEGORY	DESCRIPTION
0	Zero Effort	There has been no 5S activity in this work area related to this criterion.
1	Slight Effort	Any 5S effort is probably the work of 1-2 people. There is no organized effort and plenty of opportunity for improvement.
2	Moderate Effort	Some attempts have been made to implement 5S, but efforts are temporary and/or superficial.
3	Minimum Acceptable Level	The entire team is working on improving their 5S implementation. Previous improvements are becoming standardized.
3,5	Above Average Results	The level of 5S in the work area is excellent. Although there is still room for improvement, the workplace is becoming world-class.
4	Sustained Above Average Results (3 audits)	After 3 consecutive scores of 3.5, a score of 4 may be awarded.
4,5	Outstanding Results	The level of 5S in the work area is world-class, a showcase for the industry. 5S is fully institutionalized in the workplace.
5	Sustained Outstanding Results (6 audits)	After 6 consecutive scores of 4.5, a score of 5 may be awarded.