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A Samsung production system-based approach to improve manufacturing process management in Vietnamese firms

1. Introduction

Samsung transformed itself from a low-cost original equipment manufacturer to a world-class corporation for two decades thanks to the new management initiative of Chairman Lee proposed in 1993. In fact, Samsung's management style is a hybrid of the best from the Japanese and American approaches. It is a unique and flexible system of developing and producing a variety of models to meet the global demand as quickly as possible (Song & Lee, 2014). Since then, Samsung Electronics, the biggest company in Samsung group, had accelerated to create an innovation ecosystem where cooperation and competition can co-exist since 2000s. That was called Samsung Production System (J. Lee, Lee, & Heo, 2015).

Since Samsung's presence in Viet Nam in 2009, local firms started to know SPS concept. Nine years later, Samsung Electronics Vietnam (SEV) partnered with Vietnamese Ministry of Industry and Trade (MOIT) to share the concept through official training programs on consulting and continuous improvement (CI) projects in order to develop the local supporting industry (Vietnam

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Industry Agency, 2018, 2020). Under the circumstance that Vietnamese firms are facing a shortage of role models to visit and study high value-added manufacturing system (Nguyen & Robinson, 2010), SPS learning has brought benefits to them and be considered as the best practice. It can be seen clearly through the analysis of five case studies. They are manufacturing enterprises of different business sectors and have a lucky opportunity to take part in programs collaborated between Vietnamese government and SEV. SEV had signed a memorandum of understanding with MOIT to provide support for local enterprises in manufacturing sector to enhance their competitiveness and further integrate into global value chains. By the time, SEV provided technical and management support to more than 42 local suppliers to join the Samsung supply chain, and thereby help the development of Vietnam's manufacturing firms management capacity and Vietnam's supporting industry in general (Vietnam News, 2019).

Through the case-based study, this paper reviewed and evaluated the improvement of Vietnam local firms in the project of SPS expansion. For the main contents, the paper begins with an overview of SPS and the mechanisms for applying in manufacturing process. Then, using five case studies from firsthand improvement projects, it presents that technique of SPS solves the challenges of manufacturing management in Vietnam.

The purpose of this paper is to introduce a more comprehensive and systematic framework that explained the real world business practices better in a world-class corporation as Samsung. To validate, an analysis of five cases will be conducted on how Samsung Electronics Corporation (SEC), has enhanced its performability and show the lesson learn for Vietnamese companies.

2. Literature review

When Lee Kun-Hee succeeded his father as only the second chairman in the company's history, his determination was not limited to "learning from Japan" with the motto "learn from and beat Japan" (Hwang, 2013). In 1993, he announced the new management initiative to take steps towards becoming a global top-tier player. Since then, Samsung's management system has been re-aligned to quality-driven goals (Song & Lee, 2014).

For more than two decades, Samsung has been grafting Western business practices onto its original impact from Japanese system. Although the two sets of business practices seemed more incompatible, Samsung navigated the paradox to transcend its success. Samsung had a strong Japanese roof because:

1) South Korea was a Japanese colony since the corporation was founded.
2) Samsung's first chairman, Lee's father, was educated in Japan.
3) the company built its corporate bone in electric industries that Japan dominated at that time. However, for quality and innovativeness, Samsung looked to the West (Khanna, Song, & Lee, 2011).

Best known to be a flagship of Samsung group, Samsung Electronics has continuously enhanced the quality management system to achieve the best quality in all products and services with the policy statement "We deliver, on the basis of an efficient quality system, the best products and services which conform to our customer requirements and expectations" (Samsung Electronics, 2020b).

Since the early 2000s, Samsung Electronics began to think about a new production system in order to deal with the technological convergence and the rapid changes in customer needs. A system of developing and producing a variety of models to meet the global demand as quickly as possible was created and named SPS. Basically, the system has been focusing on speed, flexibility and high quality. Samsung Electronics has tried continuously to improve production system with the support from supplier strategy (J. Lee et al., 2015).

In terms of productivity, a unique and flexible production system has been created. In order to reduce manufacturing lead time, SPS mixes cellular manufacturing and modular production system for each product. Samsung uses one-person cell production where one worker does all the assembly and quality inspection for a finished product, and a block cell production system, in which four to eight workers collectively assemble and test a smartphone. In the meantime, modular production system is a production method that a certain company assembles the modularized parts, which are made and delivered from the partner companies (Rogers & Bottaci, 1997; Sako, 2003; Song & Lee, 2014; Wong & Lee, 2022).

In respect of quality, Samsung has used diverse concepts to excel in quality improvement and profitability gain simultaneously. Samsung Electronics established its initial quality control system by benchmarking Japanese enterprises for a long time. Various methods such as TQC, TPM, Lean production have been employed However, Samsung Electronics integrated Western methodologies like six sigma, TRIZ into its quality system with the aim of outperforming its Japanese competitors (Shin & Kim, 2015). Samsung is achieving significant outcomes through Six Sigma with the perfection in its products, processes and personnel (Choi, Kim, Leem, Lee, & Hong, 2012; Park & Gil, 2006; Yang, Choi, Park, Suh, & Chae, 2007). Today, Samsung Electronics

finds its own way to secure excellent in quality with the policy statement "We deliver, on the basis of an efficient quality system, the best products and services which conform to our customer requirements and expectations" (Cain, 2020). Samsung's Quality Management System (QMS) is built based on international standards such as ISO 9001 and IATF16949, and continuously effort to meet their customer requirements, combing with an effective working of three levels of audit quality (third-party audit by International standard certification body, second-party audit by customer audit, and internal audit). QMS also includes a comprehensive quality documentation system that precious instructions for all employees. All employees are committed to the concept of "No Spec No Work" (it means that we don't work without standards) and perform all applicable quality improvement activities continually (Samsung Electronics, 2020b; Wong & Lee, 2022).

Regarding delivery, the just-in-time delivery was kicked off. A purchasing information system connected to supply change management (SCM) system via the online portal provides the suppliers with forecasts on products and production schedules three months in advance, ensuring timely delivery of materials and keeps inventory at a minimum. By doing that, delivery speed increases while costs reduce (Rumetna, Renny, & Lina, 2020; Song & Lee, 2014).

In addition, another success factor of SPS is human resource (HR) management. Samsung Electronics concentrates on HR development and training system because it believes that employee education is the core of the company's success (Chang, 2012). SEC runs a merit-oriented personnel system that includes two separate systems for the promotion of managers and staff. Promotion for staff is determined mainly by the results of examinations, length of service, job performance evaluations, and awards received whereas promotion for managers has moved more toward the ability-oriented system. Manager evaluation in the competency appraisal focuses on three factors: employee-oriented characteristics, problem-solving competence, and leadership skills (Pucik & Lim, 2001).

Samsung electronics is also well known for an effective training program. Training time per employee in 2015 achieved 78 hours (Samsung Electronics, 2016). New employees go through four weeks' in-house training at its training center to transform a college graduate into a 'Samsung-man', loyal to the organization (Kim, 2007), and then participate in a one-year training covering a variety of business fields through on-site work. The employee training aims to raise their ability to have job specification level. Every quality professional

is trained to master six sigma; the progress starts from green belt, black belt, to master black belt (K.-C. Lee & Choi, 2006). And not similar to GE's six sigma where only managers and specialists were involved in the system, Samsung's six sigma embraces the entire rank and file participated (Khanna et al., 2011).

Most of the quality and reliability professionals among SEC's employees have received training in SEC's in-house education and certification programs like MBA. Trainees are divided into different groups according to rank and operate to develop into group leaders (Chang, 2012). Some of them are sent abroad to become regional experts (samsung Electronics, 2020a).

3. Materials and methods

The motive for doing research is to bring benefits to Vietnamese manufacturing companies through knowledge spillovers and adoption. The research is a combination of descriptive and field research. The research will describe a management practice under Samsung style, but will emphasis manufacturing management to find out a new insight into its effectiveness to Vietnamese manufacturing sector. Secondary data are collected from an analysis of documents from Samsung and some sources such as Websites, journal papers, reports, news.

Field research was used with five case studies for some reasons. Firstly, it is unquestionably difficult to collect data for doing research in Vietnam. The publicly available data sources pose many problems, like inaccurate, outdated, and inconsistent data (Nguyen & Robinson, 2015). Vietnam's secretive business environment makes it hard to get any information from executives and managers without the right contacts and endorsements (Gainsborough, 2007; Hoang, Igel, & Laosirihongthong, 2010). Secondly, case methodology has a number of strengths. Since the cases are based on realistic firms, the study will have high validity with practitioners who are end-users of it (Voss, Tsikriktsis, & Frohlich, 2002). A case-study approach is useful when exploratory investigations in which the variables and the phenomenon are not well understood (Stuart, McCutcheon, Handfield, McLachlin, & Samson, 2002). It also most importantly helps in the early development of a research field like CI practices in emerging economies (Mellahi & Eyuboglu, 2001).

3.1. Cases profile

The case companies also meet reliable conditions as follows:

1. Firstly, they are chosen to take part in the training and consulting programs based on collaboration between Vietnam Ministry of Industry and Trade and Samsung Electronics Vietnam.
2. Secondly, their improvement projects were undertaken in 2020 under the support of the Samsung experts.
3. Finally, they are under the best understanding of the authors. The authors conducted consulting at two enterprises while we peer-reviewed and deeply interviewed with the consultants of other four cases.

These companies are located in north Vietnam and in different industries. Table 1 will provide a brief summary of each company. The five companies are disguised to ensure confidentiality and anonymity.

Table 1. Summary of major characteristics if five case studies

Case	Main product	Year of establishment	Numbers of employees (2020)	Kinds of production	CI practices in used
Company 1	Precision machinery	2015	54	Mass production	ISO 9001
Company 2	Plastic printing	2001	60	Mass production	ISO9001, ISO14001, 5S
Company 3	Plastic bags	2011	154	Mass production	ISO 9001, 5S, lean production
Company 4	Packaging and invoice printings	2014	103	Mass production	ISO 9001
Company 5	Machine parts	2013	230	One-off production	ISO 9001, ISO 12100, ISO 7731, TQM; employee idea systems, lean production.

Source: summarized by author

Company 1

Company 1 is a privately owned mechanical engineering firm. In Vietnam, it is a small enterprise. The company was founded in 2015 as a small engineering workshop. The year 2018 marked an important milestone in the development of the company with the establishment of supporting departments like technical, sales, accounting and administrative department. Company started to drive towards professionalism in production and business. Although the company is ISO 9001:2015 certified by the private organization in Vietnam, there is no preventative and corrective action systems in place. It failed to implement 3S (sort, set in order, shine) in the manufacturing area. Company focused on immediate production and chased after the production deadlines. So, it had not enough time to concern about quality, productivity or a formal plan to improve its existing production system. Also, company dealt with the biggest problems of low-skilled personnel and old machines.

Company 2

Company 2 is a privately medium company that have about 20 years experience in plastic printing. It is a supplier of some FDIs like Cocacola, Nestle or Miwon. The company got ISO 9001:2015 and ISO 14000:2015 certified from a private organization in Vietnam. However, the quality management system and environment management did not meet all criteria of the ISO. It implemented 5S (sort, set in order, shine, standardize, sustain) methodology several times, and had some basic achievements. Drawbacks of the production system come from personnel. Frontline employees were low-skilled and temporary. They were someone who yesterday was working in the rice paddies, but today was in the factory. Meanwhile, middle managers did not have proper knowledge to manage manufacturing system as well as expected. Hence, it was not able to achieve the production goals.

Company 3

Company 3 is a privately medium company whose plastic bags exported to Japanese companies. They were not sold in the domestic market. The firm got ISO 9001:2015 certified by an international organization and applied 5S methodology very well thanks to the support from Japanese experts. It tried to apply lean concept; but it was not successful. It had skilled, young and royal employees who had been working there for at least 5 years. The reasons behind employee engagement were good wages and bonus incentives. Its middle management was able to manage manufacturing system to reach

stressful production targets. Nevertheless, it had some challenges such as very small factory floor, overtime hours, and employee involvement in the CI. Even though, the frontline workers were young, they never expressed their ideas or voiced any initiatives. They did passively what the middle and top management asked them to do. In addition, the shop floor usually worked for more than 12 hours per day and worked at weekend.

Company 4

Company 4 is an equitized company that is conversed from a state-owned enterprise into a joint stock company. It is a packaging and invoice printings manufacturer. It is a big firm in Vietnam and collaborating with a large number of local companies. Despite getting much benefit from manufacturing, the infrastructure was deteriorating. It got troubles of operation expanse and moving to a new location due to legal proceedings. As a result, it did not pay much attention to improve manufacturing conditions. It concerned more about quality management to be ready for the expansion at the new plant.

Company 5

Company 5 is a machinery firm that pursues the one-off production or job production. Although it is young with just over 7 years of operation, it is a tier-1 vendor of Samsung display, and other big MNCs like Canon, Yamaha, Sumitomo, etc. It got certifications of ISO 9001, ISO 12100, and ISO 7731. It tried to comply strictly with quality approaches such as ISO, TQM, lean production, and employee idea system; and it was successful to some extent. When it took part in the CI projects under Samsung style, it just moved to the new location and restarted production. It was facing problems such as setting up new conditions and work force replacement, except for a handful of employees and key middle managers.

3.2. CI implementation method

CI projects in all five cases were under Samsung style. In general, they last about ten weeks and include principal milestone:

1) CEO meeting.
2) Kick off ceremony.
3) Benchmarking tour.
4) Final report.
5) Controlling process after the final report day.

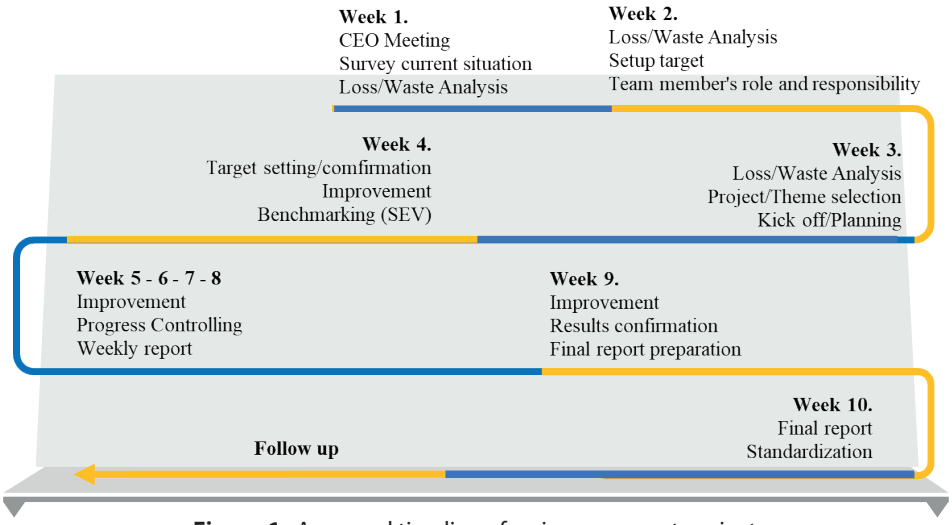


Figure 1. A general timeline of an improvement project
Source: Samsung Electronics Vietnam, 2020

On the CEO meeting report, consulting plan is shown; implementing agreement is committed; and one thing that is very important is task force (TF) team establishment. TF team must be led by a member of the board of directors and encompasses leaders and frontline staff of involving departments.

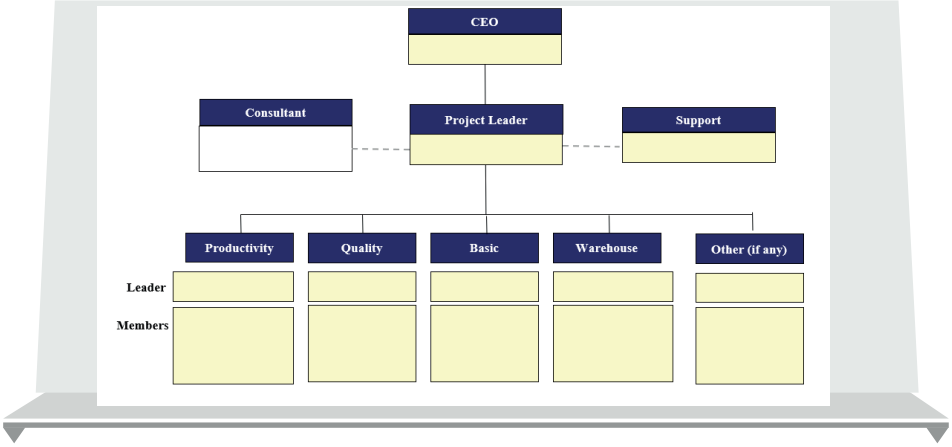


Figure 2. A structure of one Task Force team
Source: Samsung Electronics Vietnam, 2020

For the kickoff and final report, three main points need to show out.

1. Firstly, it is an evaluation method of efficiency of CI. This is the Samsung's method, "Evaluation checklist of performance indicators (KPI, System, Certification)". Two kinds of scores, before and after improvement. Once the project finishes, the score needs to increase to prove that the project is successful. In contrast, the project is considered failure if the score decreases.

Table 2. Evaluation checklist of performance indicators

Criteria	Weight	Details	Way to go	Evaluation
Process management	70%	P.Q.C.D.B	Checklist	1. Production management (16%) 2. Quality management (9%) 3. Cost management (6%) 4. Delivery management (22%) 5. Basic (17%)
Performance management	20%	KPI	Monthly performance or ne year data management by KPI	1. P: Equipment expansion effect, Efficiency of work, Production per person, Lost (7%) 2. Q: Process defects, Customer defects (7%) 3. C: Number of days in stock (3%) 4. D: Delivery compliance (3%)
Management system application	5%	ERP; MES	System operation	1. ERP: Full applied (2.5 %), Partly applied (1.5 %), Unapplied (0 %) 2. MES: Full applied (2.5 %), Partly applied (1.5 %), Unapplied (0 %)
Certification	5%	ISO	Certificate	1. ISO 9001 (Quality) + ISO 14001 (Safety) (1 % for each 2. ISO 45001 (Hygiene and health) (certified 3 %, Uncertified 0 %)
Total	**100%**			

Source: Samsung Electronics Vietnam, 2020

2. Secondly, they are big improvement projects that are classified into five areas, namely P. Q.C.D.B (P is production; Q is quality; C is cost; D is delivery; and B is basic or 5S3R and safety approach).

3. Finally, KPI target indicates figures that the projects need to achieve after improvement.

Table 3. A template of KPI target of the projects

Category	Item	Unit	Basement Measurement	Target (↓ or ↑)	Improvment (%)	Mark
Productivity						
Quality						
Cost						
Delivery						
Basic						

Source: Samsung Electronics Vietnam, 2020

In terms of benchmarking, local firms come and visit the plants of SEV. They can see the effectiveness of CI and figure out how to apply them in their own operations.

4. Research results

4.1. Summary of the findings from case studies

Although CI is not a strange practice, Vietnamese firms are still struggling to pick low-hanging fruits. Previous researches (Nguyen, 2015a; Nguyen & Robinson, 2010, 2015) showed challenges to manage CI in Vietnam as follows:

1. Vietnamese firms just focus on immediate survival and profits rather than on long-term sustainability.
2. There is a shortage of skilled labour. Managers and employees at all levels do not get up-to-date CI education and training.
3. Employee idea system does not work well. Employee involvement and empowerment in CI is limited.
4. Companies have a little experience in CI. They do not have opportunity to visit and learn from the role models like Samsung or Toyota.

This study also illustrates these above-mentioned challenges in all companies and some other problems in each case company (see table 4).

During the CI period, it was founded that five cases faced many production matters that covered all aspects P.Q.C.D.B such as waste existing, uncontrollable good quality, bad environment in the factory floor. Root causes came from 4M1E (man, machine, material, method, and environment):

1. Both managers and their staff were not good at CI methodology and knowledge of manufacturing.
2. Machines were old version and low technology.
3. Input materials were not good because all firms prioritised cheap materials to have cost competitiveness. And cheap materials were poor-quality.
4. CI practices in these firms were a mixture of their customers' standards including both local and international customers. They are also young and inexperienced so that they need time to familiarize themselves with international standards and create their own CI practices.
5. Manufacturing environment was not as good as expected due to a lack of capital.

Table 4. A summary finding from five case studies

Case / Main problems of existing production lines	Company 1	Company 2	Company 3	Company 4	Company 5
HR management	Skilled labour shortage Weak CI education and training Weak compensation structure Not have a TF team	Skilled labour shortage Weak CI education and training Weak compensation structure	Weak employee involvement and employee empowerment mechanism	Weak CI education and training Not strong employee involvement and employee empower-ment mech-anism	Weak CI education and training Not strong employee involvement and employee empower-ment mecha-nism

Production	Waste existing Not update SOP (standard operating procedure) Not apply VSM (value stream mapping) Not measure OEE (overal equipment effectiveness) Apply only breakdown maintenance	Waste existing Not have SOP Not apply VSM Not calculate OEE exactly Apply only breakdown maintenance Not calculate exact lead time	Waste existing Just apply breakdown maintenance and time-based maintenance Not calculate OEE Some points of congestion in the production line (bottleneck points)	Waste existing Not update SOP Just apply breakdown maintenance Not calculate OEE Not control production schedule closely	Waste existing Not have SOP Not good control of spare parts
Quality	Do only QC (quality control) activity Random inspection system Not apply quality circle Use only checksheet to monitor quality defects NG (not good) rates: 25%	Regular line stop Do only QC activity 100% products inspection Not apply quality circle Use only checksheet, graph, pareto chart to manage quality Apply very simple pokayoke (fool proofing) mechanism to avoid mistake	Do only QC activity 100% product inspection High work-in-progress defects of 0.77% Use only checksheet, graph, pareto chart to manage quality	Do only QC activity Random inspection system High NG rate of 15% Use only checksheet, graph, pareto chart to manage quality substandard conditions of the QC area	Do QC and QA activity Random inspection system Use only checksheet to manage quality
Cost	Not tracking Quality cost, COPQ (cost of poor quality) and COGQ (cost of good quality)	Not calculate exactly Quality cost (COGQ and COPQ)	High cost of electronic consumption Not calculate exactly COPQ	Not calculate Quality cost (COGQ and COPQ)	Not calculate COPQ

Delivery	Problems of work-in-progress inventory Not good production layout	Not good production layout	A cramped plant Problems of work-in-progress inventory Not good production layout at the warehouse	Not good production layout	New plant and factory floor Reset up new layout
Basic	Failure in 5S Not good visual management	Small achievement in 5S	Not good fire safety A danger of the forklift movement in the factory floor	Not good 5S3R Not good visual management Not good safety condition	New plant and factory floor Restart 5S3R and visual management
KPI	Not have KPI for production process	Not have KPI for production process	Not have KPI for production process	Not have KPI for production process	Not have KPI for production process

Source: Summarized by author

Under the circumstance, SPS-based solutions were introduced and applied in the ten weeks. The solutions concentrated on key factors below:

1. Man: focus on CI training (knowledge and importance of CI concepts, CI methodology, CI tools); focus on increase employee involvement.
2. Machine: maintenance priority.
3. Materials: improve design system (product specification) to identify input and work-in-progress materials; apply just-in-time material provide in the process.
4. Method: focus on quality and eliminate wastes, for example, applying lean production to eliminate waste; applying TQM to improve quality management; applying SPC to collect data and make a right decision; applying fool proofing to prevent mistakes and errors; tracking and managing COPQ to save cost; applying visual management;
5. Environment: apply 5S and safety condition (labour and fire safety).

From the focused factors, techniques and tools were applied and got fruitful achievements.

Table 5. A summary of CI techniques and tools used in five cases

Area	Techniques	Tools
HR	Samsung's training systems and programs for HR development	Increase in training time (once a week) Employee idea system Daily short meeting before the shiftwork Compensation system Brainstorming, mindmap
P	Samsung's 10 wastes identification (overproduction, inventory, motion, defects, over-processing, waiting, and transport, quantity loss, equipment loss, space loss) Apply Lean production Apply PM (preventative maintenance)	VSM, SOP, OEE, PM
Q	Apply TQM Apply ISO 9001: 2015 Apply MSA (Measurement System Analysis) Apply SPC (Statistical process control)	TQM system (Quality Planning, Quality Assurance, Quality Control, Quality Improvement) 7 Basic tools 7 management tools Data collection, statistics and analysis Control chart TRIZ, SCAMPER Poka-yoke (fool proofing)
C	Break out Quality cost, including COPQ and CQGQ Break out COPQ, including internal failure costs, external failure costs Break out COGQ, including prevention costs and appraisal costs	
D	Just-in-time delivery Maximise material flow Manufacturing process analysis	Line of balance LOB One way material flow Cell line, U line Kanban
B	5S methodology Safety conditions	5S; fires safety requirements and tools; labour safety guideline and tools

Source: Referred by Samsung Electronics Vietnam, 2020

Based on conditions and problems of five firms, a number of CT tools and techniques were applied such as 7 basic tools, LOB, PM, Cell line, Kanban, TRIZ, 3S. They are basic and easy to learn and use. As a result, five companies got some big achievements like:

1. HR: Initially, employees and managers were unfamiliar with some tools and techniques; but they learnt how to use it through training time. After ten weeks of learning and using, TF team members got some knowledge of methodology and practices. They had opportunities to brainstorm with their managers (even top managers) and got good assessment. Employees were more comfortable to share their initiatives to fix problems. Company 5 started to have a short meeting before the shift work like Samsung.
2. P: (1) waste was reduced in all firms. For example, a decrease in defect rates thanks to quality tools, a reduction in work-in-progress inventory thanks to just-in-time delivery, minimization of person motion thanks to do 3S, elimination of unnecessary process, a drop in waiting time thanks to LOB, a decline in transport inside the plant due to optimized plant layout, etc. (2) Machines and equipment were maintained; and PM method was also established in company 1 and company 3; (3) SOP was set up and updated in five cases.
3. Q: the most striking feature was data collection. For Samsung, quality means data. Quality improvement must base on data. In the meanwhile, five firms had not considered the importance of data before the CI projects. During the projects, data started to collect and analyze through quality management tools. The root causes also found out through Cause- Effect diagram and process control chart.
4. C: Quality cost was paid serious attention for the first time. Although COPQ did not decrease clearly in ten weeks, some costs did. For instance, electric costs or labour costs dropped.
5. D: Many delivery projects were carried out to reduce manufacturing space and maximize material flow.
6. B: Every firm learnt and did 3S well during CI time. Fire safety and labour safety were consolidated. Working environment became better and better.

In general, the following tables and figures will illustrate the CI results. All KPI and criterial increase remarkably.

The number of projects and completion rate were also high in all of the enterprises. The number of projects were over 30 in average with a completion rate of 85% even though the time of projects were short. Therefore, the HR

development index (improvement idea) from the SPS's system is enhanced as shown in table 6.

Table 6. Completion rate of six enterprises

Case	Item	Completion rate					
		P	Q	C	D	B	Total
Company 1	Numbers of improvement projects	14	6	3	1	9	33
	Numbers of completed projects	14	5	3	1	8	31
	Completion rate	100%	83%	100%	100%	89%	**94%**
Company 2	Nu3mbers of improvement projects	10	7	1	15	8	41
	Numbers of completed projects	9	7	1	13	8	38
	Completion rate	90%	100%	100%	87%	100%	**93%**
Company 3	Numbers of improvement projects	7	5	1	4	17	34
	Numbers of completed projects	7	5	1	3	17	33
	Completion rate	100%	100%	100%	75%	100%	**97%**
Company 4	Numbers of improvement projects	9	9	2	4	17	41
	Numbers of completed projects	8	8	1	4	17	38
	Completion rate	89%	89%	50%	100%	100%	**93%**
Company 5	Numbers of improvement projects	1	10	1	2	8	22
	Numbers of completed projects	1	9	1	2	8	21
	Completion rate	100%	90%	100%	100%	100%	**95%**

Source: Summarized by author

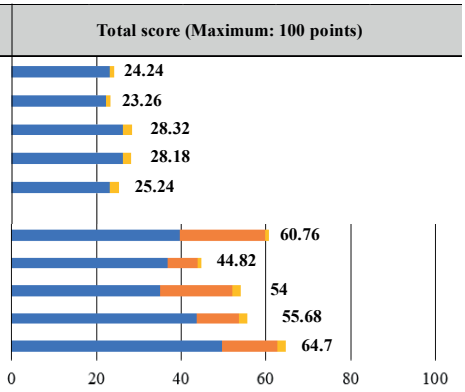
The overall of the score from all case companies are increased.

Most of companies have increased of score in "process management" with evaluation weight is 70%, some of them have significantly improvement in most of KPIs of "performance management" such as Company 1 and Company 3. Besides, there are no management system such as ERP, MES, or some other software applied and no additional certificate has provided in all of case

companies during the project. Table 7 show the overall of improvement in production system management score before and after deployed the Samsung's projects and evaluated by the TF team.

Table 7. Overall score comparison after deployed Samsung's projects within case companies

		Pro. Mgt (Avg)	Per. Mgt	Mgt. Sys Apl	Cert.
Before	Company 1	23.24	0	0	1
	Company 2	22.26	0	0	1
	Company 3	26.32	0	0	2
	Company 4	26.18	0	0	2
	Company 5	23.24	0	0	2
After	Company 1	39.76	20	0	1
	Company 2	36.82	7	0	1
	Company 3	35	17	0	2
	Company 4	43.68	10	0	2
	Company 5	49.7	13	0	2

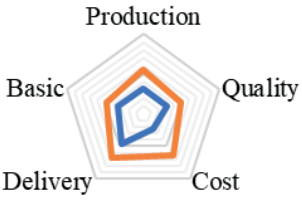


Source: Evaluated by author

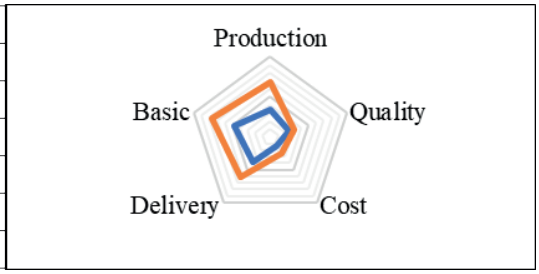
4.2. Detail of improvement

Process management. The score evaluation of checklist on P.Q.C.D.B increased significantly from all the case companies. The average score of all five companies before deployed the projects are 34.65 points had increased into 58.56 points after ten weeks (the level of evaluate for process management from zero to 100 points). The evaluation as shown in figure 3 indicated the improvement of the company processes management in most of five criteria.

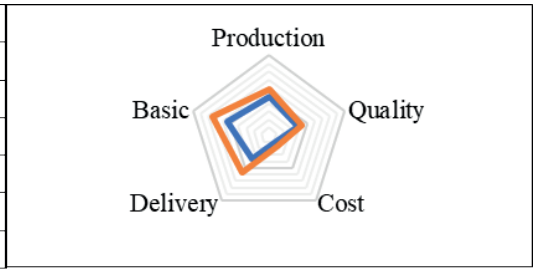
Company 1	Evaluated score	
	Before	After
Production	32	56
Quality	32	49
Cost	22	63
Delivery	46	68
Basic	34	48



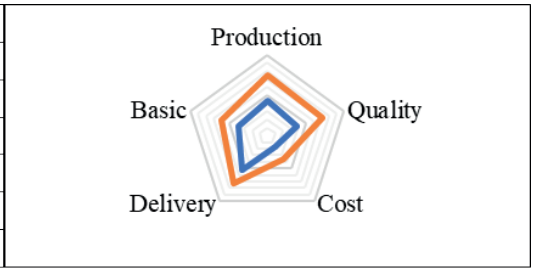
Company 2	Evaluated score	
	Before	After
Production	35	68
Quality	25	31
Cost	13	25
Delivery	38	62
Basic	48	77



Company 3	Evaluated score	
	Before	After
Production	49	58
Quality	38	44
Cost	11	16
Delivery	35	57
Basic	55	75



Company 4	Evaluated score	
	Before	After
Production	43	74
Quality	38	71
Cost	17	35
Delivery	52	72
Basic	37	60



Company 5	Evaluated score	
	Before	After
Production	38	68
Quality	39	80
Cost	20	59
Delivery	42	68
Basic	27	80

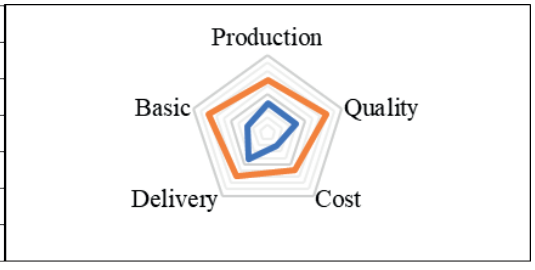


Figure 3. Results of process management at enterprises

Source: Evaluated by author

Performance management: The TF team from five companies have built up the KPIs system for their own project in ten weeks to compare before-after results of improvement. At that phase, the number of main KPIs were depended on the target of the project on P, Q, C, D, or 5S3R. However, the methodology of KPIs setting is success deployed in all case companies.

Table 8. Summary of KPIs have used in projects

	P	Q	C	D
Company 1	√	√	√	√
Company 2	√			
Company 3	√	√		√
Company 4	√			√
Company 5	√		√	√

Source: Evaluated by author

Management System application and Certification: Score of each firm before and after were the same because system and international certification could not get in the short time of two or three months (the period of the projects).

5. Conclusions

This study contributes to the understanding of SPS principles and how it is adopted in Vietnamese firms. In the context that Vietnamese companies need the world-class practices to achieve a big ambition of be a part of global value chain, SPS is a valuable approach. The findings of this study highlight that five selected cases get significant benefits and profits from CI projects that are implemented under SPS approach. Broadening the findings to every single company in Vietnam is necessary to push their manufacturing capability. It is the authors' hope that local enterprises can adopt and adapt SPS and then create their own CI practices. In following time, the case companies should continue implement CI practices to achieve the higher of production performance as desired. SPS can become a suitable system for improving production processes for Vietnamese companies because

there are similarities in culture, nature conditions, and industrialization direction between Vietnam and Korea. The experience from Samsung way in production development is a great opportunities for Vietnam companies to enhancing manufacturing efficiency and competitiveness. This study also improve its value to not only Vietnamese business but also the business community of the developing countries.

Abstract

Today, more and more Vietnamese firms consider continuous improvement as the best way to increase their manufacturing capability. This paper aims to illustrate the effectiveness of manufacturing processes management from the Samsung production system (SPS) approach when it was implemented to improve capability of existing production process in Vietnamese firms. The paper is a combination of descriptive and field research to demonstrate how SPS principles are appropriate for five real industry cases in particular and all Vietnamese manufacturing companies in general. In five cases, the usage of SPS-based tools has turned out to be fruitful. They solved problems of continuous improvement management in Vietnamese firms and created significant achievements in quality improvement and productivity increase. The paper investigates the core value of Samsung's continuous process improvement. The way that Samsung has used to improve quality and profitability simultaneously can be adapted by manufacturing companies.

Key words: *Samsung Production System, Continuous improvement, Manufacturing process, Vietnamese firms.*

JEL
Classification: D24, L23, L60, M10

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