

Keynote Paper:
TQM Excellence Model for OBOR Countries' Sustainable Development

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ABSTRACT

*Based on the 'Best Paper-2010' awarded by the TQM Journal, the author has a chance to test out the model in a number of firms in Malaysia through the Standards and Industrial Research Institute of Malaysia (SIRIM). Furthermore, riding on the success, SIRIM has named it as the **SIRIM Green 5-S Model**. Like many middle-east countries, Malaysia is considered as a 'developing country'. As a result, the aim of this paper is to share the experience of the "SIRIM Green 5-S (G5S) Model for Developing OBOR Countries". Since 1993, the author used the proprietary G5S (=5-S + Lean 5-S) Checklists for training and consultancy in no less than 10 countries with over 50,000 persons from around 2,000 organisations world-wide. On the other hand, HKSAR takes the lead in the GDP / global oil energy consumption. The experience will also be shared in this article. It is hope that organizations will be able to master this model for lean production and sustainable organizational development.*

Keywords: 5-S Practice, Quality, Productivity, TQM, Lean 5-S (L5S), Lean Management, OBOR, Sustainable Development

1. Introduction

Porter (1980) advocated Sustainable Competitive Advantage as one of the most important factors for organizational successes. Over the past three decades, his 5-force model (Customer, Supplier, New Entrant, Substitute & Rivalry) has been considered as the 'bible' in explaining the competitive scenario for businesses. However, during his era, oil crisis and financial tsunami was not that significant. Since the beginning 2008, the oil price has soared to US\$148/barrel. This calls for the pressing need for LEAN, the most important word for any organisations in the contemporary world. By now, the oil crisis seems to have been over. Unfortunately, it has ignited the September 2008 Financial Tsunami (Chan, 2008), a much bigger problem than the oil crisis which we can live with. The American financial crisis has sent shockwaves throughout Asia as governments, banks and corporations scramble to cope with plunging share prices, international financial turmoil and the prospects of a serious downturn in the US and other major economies. As a result, the aim of this paper is to explore an "*Integrated Lean TQM Model*" that is applicable to the developing African nations.

The 5-S is a first step towards TQM. Over the last century, the Japanese have formalised the technique and name it as the 5S (#) Practice (Osada, 1991). Prof. Sam Ho has improved and defined its terms in English and developed the world's first 5-S Audit Checklist in 1993 (see **Table-1**). In 1998-2000, a US\$600,000 grant was given to train up 2,500 5-S Lead Auditors in Hong Kong. By now, over 50,000 people have been trained, with over 2,000 organisations, around half of which have been certified as the 5-S Registered Organisation.

As differentiated from the Japanese '5S', the one created by the Author was named as '5-S' since 1993.

Table 1: The 5-S in Summary

(* created by the author in 1993 as Quality Expert under the Asian Development Bank TQM project for Malaysia)

Japan 5S	SIRIM 5-S *	SIRIM 5-S in Malay *	五常法 *	50-pts. *	Typical Example * (from the 50-pts.)
<u>S</u> eiiri	<u>S</u> tructurise	<u>S</u> truktur	常組織	10	Throw away rubbish & return to store
<u>S</u> eiiton	<u>S</u> ystematise	<u>S</u> istematik	常整頓	10	30-second retrieval of a document
<u>S</u> eiiso	<u>S</u> anitise	<u>S</u> anitis	常清潔	5	Individual cleaning responsibility
<u>S</u> eiketsu #	<u>S</u> tandardise	<u>S</u> tandard	常規範	15	Transparency of storage & Fool-proof
<u>S</u> hitsuksuke	<u>S</u> elf-discipline	<u>S</u> entiasa disi.	常自律	10	Do 5-S daily & 5-S Audit

Original meaning 'Cleanliness', has been replaced with 'Standardise'.

2. 5-S Experience

The author was widely recognised as the one transplanting this useful quality technique to the western world. There are many examples of successful implementation of some principles of the 5-S, especially in the service sector organisations, such as fast-food restaurants, supermarkets, hotels, libraries, and leisure centres. In most Asian countries, the Japanese 5S has been promoted by their productivity organisations under the umbrella of the Asian Productivity Organisation in the early 80s but they all died down very quickly. With the benefits of hind-sight, the author thinks the main reason for failure was the lack of systematic approach to its implementation.

The author's first encounter with the 5S was when he was doing a research project for the Asian Productivity Organisation in Japan in 1987. Most of the 24 firms visited had implemented some sort of 5S activities. The idea was developed in 1993 when he was invited by the Asian Development Bank as the Quality Expert to the Malaysian Government. At the Standards and Industrial Research Institute of Malaysia (SIRIM), he was asked to develop a 5-year National Quality Plan for the country. After spending a month's time to analyse the industrial development of Malaysia, he came to the conclusion that the first step to their quality programmes should be the 5S. Then the Director General asked the author to be their 5S Champion. Being an ISO 9000 Lead Auditor, he firmly believed that the best way to acquire a quality technique is to do auditing according to the technique. So, it came to his mind that he should develop the world's first "5-S[®] Checklist", which he now finds as the most powerful tool for learning the 5-S[®]. The registered 5-S is differentiated from the Japanese 5S (without Audit Checklist), by putting a hyphen between the '5' and 'S'.

3. From the 5-S to TQM

Research by Ho (1995) has shown that the western world seldom recognises the significance of the 5-S practice although there are indications that some companies have included some aspects of the 5-S in their routines without being aware of its existence as a formalised technique. There are many examples of successful implementation of some principles of the 5-S, especially in the service sector organisations, such as fast-food restaurants, supermarkets, hotels, libraries, and leisure centres.

The difference between the Japanese and western approach lies mostly in the degree of employee involvement. The 5-S has become the way of doing businesses, not only to impress the customers but also to establish effective quality processes as prerequisites for good products and services. Through in-depth research in Hong Kong, Japan and the UK, the author has identified the 5-S practice as the step number one for a TQM programme (Ho & Fung, 1994 & 95).

4. The 5-S Practice in Detail

Reference is made to the proprietary **5-S Audit Checklist (Appendix 1)** developed by Ho (1995). McGregor (1960) identified two human attitudes towards work. In his Theory X, he observed that humans dislike work and would like to get away from work if possible. On the contrary, in his Theory Y, he observed that humans actually like working and they work as hard as they can to achieve results. This is the case when people are motivated to do their work. Ouchi (1981) observed many successful Japanese and American firms and found out that people actually consider the organisation as part of their family. The staff in these companies devote so much energy and time to their work that one might think that it is their own business. This type of devotion to work pinpoints the essence of Ouchi's Theory Z. His research shows that it applies not only to the Japanese workers but also to the American counterparts.

In order to make a successful and painless transition from Theory X to Theory Y and then to Theory Z organisations should install some degree of discipline in the form of procedures and work instructions. Consequently, self-discipline can be developed. Ouchi has refined McGregor's theory, as he found out that self-discipline is important for organizational success. This theory in fact is not new. Philosophers in the past have already emphasized the importance of self-discipline. Here are some well-known quotations:

"Self-discipline and Self-confidence are twins. Without Self-discipline, there is no Self-confidence."
William Somerset Maugham (British Play-writer, 1874-1965)

"The Success of a person depends on his Self-confidence and Self-discipline." El Código Secreto (Greek Philosopher, 306 b.c.)

Unfortunately, the above philosophers and management gurus did not point out 'how' people can be trained to have self-discipline. The answer lies in **Table 1**. 5-S, when implemented properly, can develop the self-discipline of employees through the first 4-S, i.e, Structurise, Systematise, Sanitise and Standardise. Moreover, with the 50-point 5-S Audit Checklist developed (**App. 1**), Self-discipline can be assured.

5. Introduction to Lean 5-S (L5S)

Through 20 years of research, initiated since awarded Oshikawa Fellow of the Asian Productivity Organisation in 1987, the author has developed a proprietary expertise in the 5-S (**App. 1**), and Lean 5-S (**App. 2**) Management Systems. Both of these Checklists have 50 points. The 5-S Audit Checklist is grouped under the five areas of the 5-S practice. Unlike the ISO standards, each check-point is kept simple and concise. The rationale for this is that, if the 'standard' itself is short, it can provide wider scope for interpretation and application. This argument has been proven over the last 15 years since the launch of the standard world-wide. Nevertheless, the detailed work instructions will be developed in the 5-S Manual, rather than the standard itself.

The same principle applies to the L5S Audit Checklist. Moreover, the auditor is required to write down the '+ %' increase in profit as arise from the increase in sales. For the '- %', it is the saving arise from cost reduction. Overall, the aim is at +10% increase in profit by both measures. In particular from past experience, the savings in electricity, gas and telecommunication can easily achieve -20%.

L5S has been adopted and adapted by many organizations in the HKSAR already. Ng (2008) reported in the HK Economic Daily that the Ocean Empire Group has increase sales by 40% and reduced cost by over US\$20,000/month by adopting the principles and practice of L5S. As for the China Light & Power Ltd., the productivity has gone up by 25%. Leung (2008) also reported in the One-Magazine that through activity sampling, a restaurant has managed to cut labour costs. At the same time, through smaller packaging, the restaurant chain has managed to save over US\$30,000/month by minimizing waste. She summarized her finding in that L5S is a very useful and practical tool to flight against the Financial Tsunami. Similar evidence was elaborated by Wan (2009) in his article on the South China Morning Post, considered the most authoritative English newspaper in the Southeast Asian region.

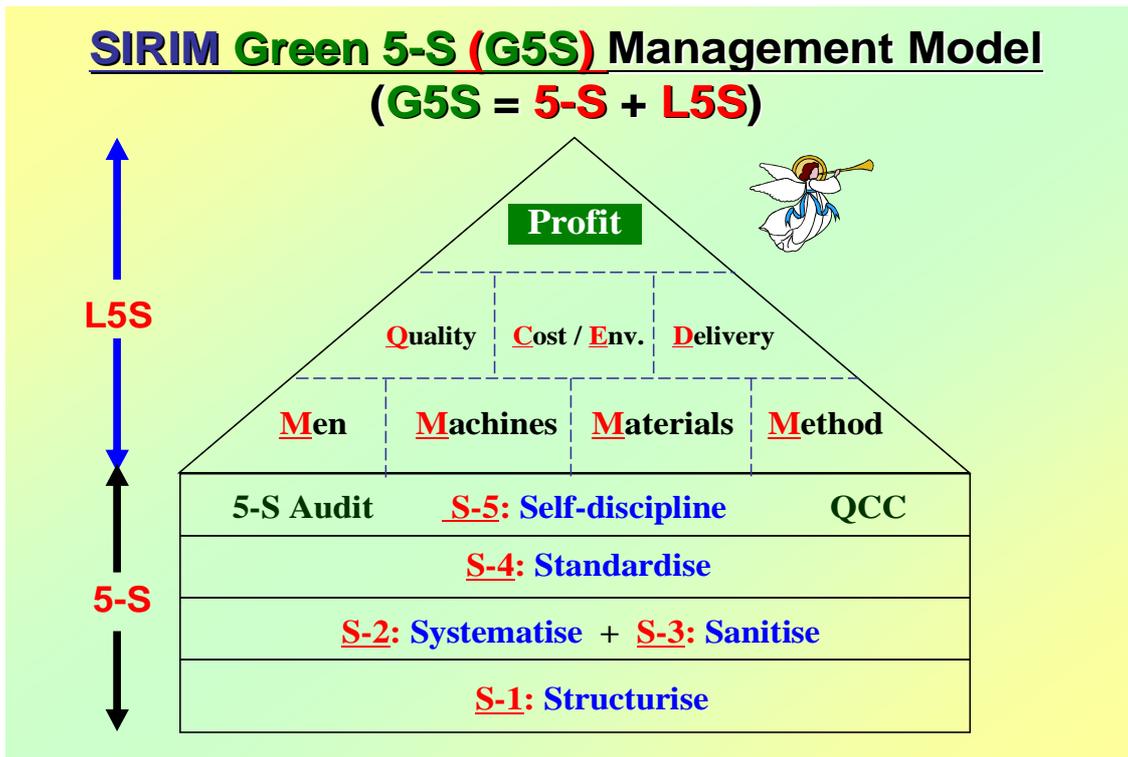


Fig. 1: I5SO-SIRIM Green 5-S (G5S) Model for Sustainable Development

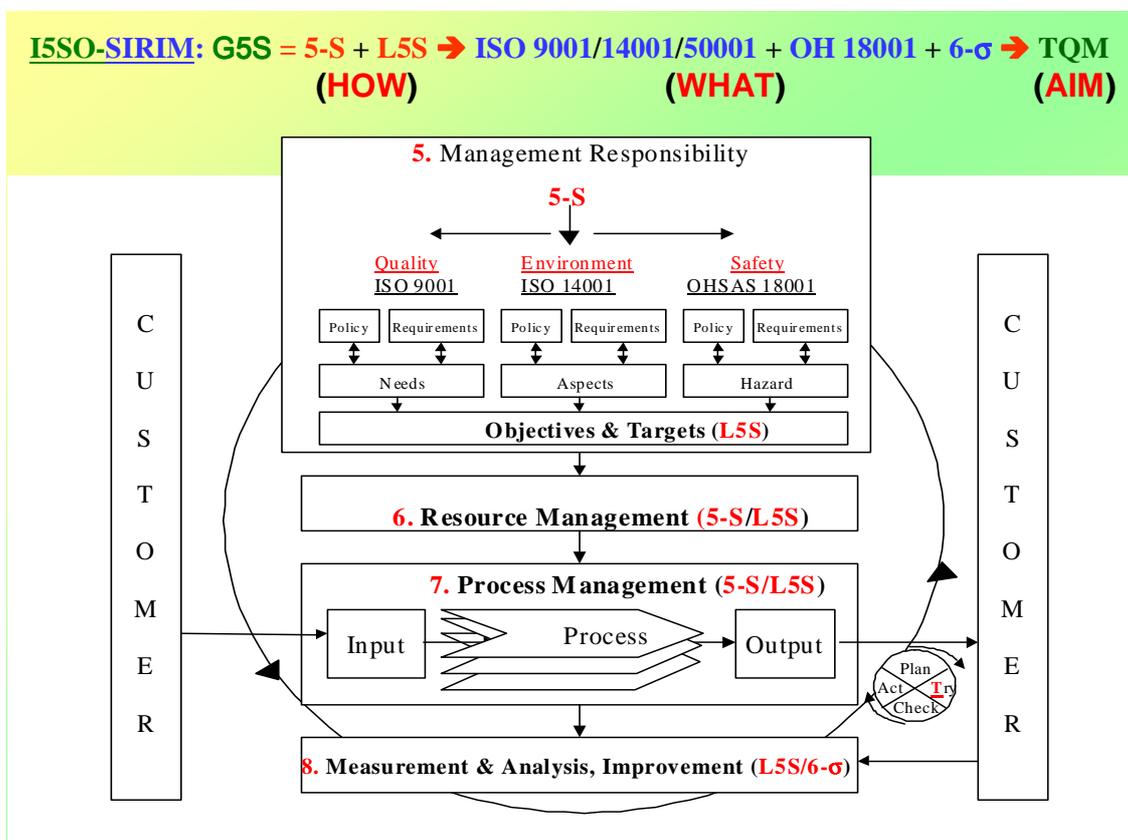


Fig. 2: I5SO-SIRIM Green 5-S Integrated Management System for Sustainable Development

Since 2005, the Author set up the International 5-S Organisation (**I5SO**) to promote the matured 5-S practice world-wide. By now, over 8,000 organisations employing over 100,000 people in no less than 20 countries (including Australia, Canada, China, Finland, HKSAR, Indonesia, Malaysia, Philippines, Singapore, Spain, Sweden, Taiwan, Thailand, UK, USA) have been using the research output in the improvement of their business by developing sound strategies and achieving significant improvements in Safety, Quality, Productivity, Speed and Image. With the above scenario in mind, SIRIM (stands for Standards and Industrial Research Institute of Malaysia) has adopted the author's checklists and promoted them as the **SIRIM Green 5-S** (= 5-S + L5S) **Model** (see **Fig. 1**) for the benefits of organisations.

In **Fig. 1**, Cost is paired with Environment in order to spell out the conflicting nature of these two organizational objectives. One have to balance out these two objectives and identify an optimal point. S-2 (Systematised) and S-3 (Sanitise) are paired as they are both actions initiated by S-1 (Structurise). Furthermore, in order to instill Self-discipline, we have to implement 5-S through teamwork (QCC) and also conduct 5-S Audit regularly. **Fig. 2** details the I5SO-SIRIM Green 5-S Management System for Sustainable Development based on the 'Process Model' of the ISO 9000/14000/50000 series of standards.

Both 5-S and L5S are the foundation for other management systems (including quality, environment, safety, 6-sigma, etc.). Through auditing according to the 5-S & L5S Audit Checklists in Appendix 1 & 2, one can identify the deficiencies of organizations easily and readily. These deficiencies have to be rectified soonest possible in order to ensure a quality environment and quality culture built into the day-to-day operations. The audit findings are classified into Non-Conformances (NCs) and Observations (OBs). The NCs are directly affecting the Safety, Hygiene, Quality, Productivity and Image and therefore have to be improved. On the contrary, the OBs are optional for improvement. Normally, for a 1-manday audit, 10 NCs are allowed as the passing mark. Nevertheless, they have to be rectified before certification is granted.

This approach was firstly benchmarked from the Toyota Production System when the author visited the first Toyota factory in Toyoda City in 1987. Then, through various consultancy experience, he has established contacts with many organisations which made use of the G5S model to achieve significant improvement and savings in their operations. Examples include: Tao Heung Group of restaurants (~70 outlets in HK/China), Neway Karaoke (~30 outlets in HK/China/Malaysia/Philippines), Tang Palace (~10 outlets in China), HK Hospital Authority (~45 Public Hospitals in HK), Northern Spain Health Authority (~30 Hospitals), DHL Group (Asia Hub), SIRIM (promoting the G5S in Malaysia since 1993), Productivity & Standard Board (promoting the 5-S practice in Singapore since 2000), SGS (promoting the 5-S practice in Philippines since 2007), etc. His recent benchmarking experience was in the capacity of the China/HK Partner of the Kaizen Institute (founded by Mr. Masaaki Imai, the former consultant for lean management at Toyota).

6. Sustainable Development in the OBOR

In 2008, the oil price soared to US\$148/barrel. This calls for the pressing need for LEAN, the most important word for any organisations in the contemporary world. By now, the oil crisis seems to have been over. Unfortunately, it has ignited the Financial Tsunami in 2008 with a tail-off effect till now in a number of developing countries enroute the OBOR. The G5S proposed in this paper has shown some evidence to help organizations overcome the damages caused by the financial tsunami. The aim is for sustainable development. To address this issue, it is important to have some objective measures of the status quo of the world's energy consumption pattern. Table 2 below shows the World GDP/Energy Consumption League Table (Ho, Ghani & Azman, 2015)



Table 2: World GDP/Energy Consumption League Table

Note:

A = GDP per Capita (2010) – US\$:

www.photius.com/rankings/economy/gdp_per_capita_2010_0.html

B = Energy Consumption per Capita (2005) - Units: Kilograms of oil equivalent (kgoe) per person

http://earthtrends.wri.org/searchable_db/index.php?step=countries&ccID%5B%5D=0&allcountries=checkbox&them e=6&variable_ID=351&action=select_years

In general, One-Belt is meant from Fuzhou (via Beijing) to Venice by road. One-Road is meant from Fuzhou (via Zhuhai) to Venice by sea. **Only selected OBOR Countries** (from 2010/2005) are shortlist in this table, together with the top of the League – Peru & the USA for comparison. This is because Peru has very low energy consumption/capita, possible due to her low economic activities.

<u>Rank</u> *	<u>Country</u>	<u>A (2010) = US\$GDP/p</u>	<u>B (2005) = KgOE/p</u>	<u>SHGI-2010 C = A/B = GDP/KgOE</u>	<u>SHGI-2007</u>
1	Peru	\$8,600	494	17.41	14.83
2	HKSAR	\$42,700	2603	16.40	15.22
10	Greece	\$32,100	2794	11.49	8.71
15	Spain	\$33,700	3340	10.09	8.36
16	Singapore	\$52,000	5,159	10.07	5.99
38	Netherlands	40,300	5,012	8.04	6.32
59	Taiwan	\$30,200	4621	6.54	6.02
64	India	\$3,100	491	6.31	7.22
72	Malaysia	\$14,700	2418	6.08	5.48
75	USA	\$46,400	7886	5.88	5.58
79	Iran	\$12,900	2381	5.42	4.38
90	China	\$6,500	1316	4.94	6.68
101	UAE	\$41,800	10354	4.04	4.72
110	Oman	\$20,200	5,549	3.64	2.83
111	Russia Federation	\$14,680	4,423	3.58	2.74
117	Kenya	\$1,600	481	3.32	2.49
	<u>World (2010/2005)</u>	\$16,136	2,691	5.18	
	<u>World (2007/2003)</u>	\$13,773	2,658		5.18

Surprisingly, such a simple and important index [**'C'** or what the author now named as '**Sam Ho Green Index (SHGI)**' in the above table] has not been found from previous literatures, despite I have searched through EBSCO, Emerald, Yahoo and Google (Ho, 2010). From the **Table 2** above, HKSAR has taken the lead in energy conservation. Moreover, comparing with those countries ranked 2-8, HKSAR has a much higher GDP/capita (US\$42,700) which is closed to the developed nations like USA, Europe and Japan. It is therefore a good indication that there must be good lessons to learn from her experience. Being born and brought up in Hong Kong, I can summarise the rationale as follows:

1. HK has the world's highest population density. Moreover, with the network of mass transit, energy in transportation is highly efficient.
2. HK has a temperate climate. Consequently, the air-conditioning bill is only high for a few summer months. There is no need for heating during the winter time.
3. Most of the HK's manufacturing base has been shifted to southern China, hence industrial energy consumption is almost zero.
4. The government gives car import tax rebate to "green" vehicles, when their km/litre consumption is above 15.
5. The government has taken the lead to reduce energy consumption by gradually increasing the air-conditioning temperature over the years to 26 degree C.
6. With no natural resources, organisations and people in HK are used to minimizing energy consumption.
7. Many organisations in HK are practising the 5-S and Lean 5-S which were introduced by the author since 1994.

In terms of 'Competitiveness', the IMD (2016) League Table in World Competitiveness Yearbook -2016 put HKSAR as **1st Position**, followed by Switzerland, USA & Singapore. For long term sustainability, the HKSAR model would have a better chance to sustain. Therefore, there are a lot of lessons that developing countries in the middle-east that can learn from the successful countries/territories at the top of the SHGI League Table, in particular in the application of the Green 5-S Model for sustainable development.

7. Conclusion

This paper pioneers in developing a practical G5S Model together with its associated checklists. It has been well-recognised that Japanese firms compete in quality, cost and speed of delivery. Over the last two centuries, the Japanese have formalised the technique and name it as '5S' Practice. Through his research in Japan in 1988, the author has re-defined the name as the '5-S' and developed the world's first 5-S Audit Checklist. Since 1993, he used the proprietary 5-S Audit Checklist for training and consultancy in no less than 10 countries with over 100,000 persons from around 8,000 organisations world-wide. In 2008, in the wake of the soaring oil prices, the author developed another Audit Checklist on Lean 5-S (L5S), aiming at minimizing wastages of all sort. From the author's long-standing TQM experience and discussion with the relevant quality experts in the field of sustainable competitive advantage, an "Integrated Lean Management System Model" or **G5S Model** was validated. More importantly, for OBOR nations, they have to make use of the G5S Model to catch up with the **SHGI**, in order to have sustainable development. Interested academics and related parties are invited to join hands to validate this model for organizations going for the global sustainability and competitiveness.

App.1: The 5-S[®] Checklist mapping with other Management Systems

5-S	What (every audit needs to be supplemented with a digital photo of around 1MB, landscape, with date)	ISO 9000	ISO 14001	OHSAS 18001	6-σ
S-1: Structurise					
1.1	Throw away/return things which are not needed.		7		
1.2	3-R: Reduce, Re-use and Re-cycle, paperless, etc.		7		
1.3	“Needed things” stored: low, medium & high usage/wt.			7	
1.4	Personal belongings kept to the minimum		7		
1.5	Treat defects, leakage, breakage and their causes			7	
1.6	One-is-best #1: daily “Things-to-do” List	7			
1.7	One-is-best #2: one set of tools/stationery/1-page form		7		
1.8	One-is-best #3: one hour meeting (be concise)		7		
1.9	One-is-best #4: one stop service for customer	7			
1.10	One-is-best #5: one location file (e.g. LAN server)	7			
S-2: Systematise					
2.1	Everything has a clearly designated name & place	7			
2.2	Every place should have a ‘responsible person’ label	7			
2.3	Security on doors and cabinets and key management			7	
2.4	Functional placement for leaflets, tools and material			7	
2.5	Filing standards and control master list	7			
2.6	First in, first out arrangement (always left in, right out)	7			
2.7	Zoning, placement marks, signage and badges			7	
2.8	Neat notice boards (including zoning and labels)				7
2.9	Easy-to-read notices (include expiry date)				7
2.10	30-second retrieval of tools, document & parts				7
S-3: Sanitise					
3.1	Individual cleaning responsibility assigned		7		
3.2	Make cleaning and inspection easy (15cm above floor)			7	
3.3	Clean the places most people do not notice (anti-SARS)			7	
3.4	Cleaning inspections and correct minor problems				7
3.5	Regular sparkling cleaning campaigns		7		
S-4: Standardise					
4.1	Transparency (e.g.: minimize doors, covers & locks)			7	
4.2	Straight line and right-angle arrangements			7	
4.3	‘Danger’ warning, fire extinguisher & exit signs			7	
4.4	Dangerous goods, mechanical safety measures			7	
4.5	Workplace work instructions and ‘passed’ labels	7			
4.6	Electrical wiring neatness and switch labels			7	
4.7	Energy Preservation – Aircon temp. mark/switch		7		
4.8	Physical handling standards and instructions			7	
4.9	Colour & Visual Mgt. -- paper, files, containers, etc.				7
4.10	5-S responsibility labels on floor plan or at site	7			
4.11	Food safety & prevent contamination at source			7	
4.12	Safety Policy & Risk Assessment			7	
4.13	Fool-proofing (Poka-yoke) Practices				7
4.14	Park-like environment (garden office/factory)		7		
4.15	The 5-S & OSH Museum (including photos before/after)			7	
S-5: Self-discipline					
5.1	Execute individual 5-S responsibilities				7
5.2	Wear suitable clothing/safety helmet/gloves/shoes/etc.			7	
5.3	Good communication & phone practices (magic-word)	7			
5.4	Do 5-minute 5-S Practice daily		7		
5.5	One day processing of job/tasks (see 1.6)				7
5.6	Safety-box and practise dealing with emergencies			7	
5.7	Organisation Chart and Performance Indicators	7			
5.8	Design and follow the 5-S Manual	7			
5.9	Quarterly 5-S Audit and Improvements			7	
5.10	Seeing-is-believing and Keep It Short & Simple (KISS)				7
	Total Count (=50) →	12	10	19	9

App.2: The L5S™ Checklist mapping with other Management Systems

L5S	Check-point	ISO 9000	ISO 14001	OH 18001	6-σ
L1	Product/Process Design (+10%)				
1.1	Customer Feedback	●			
1.2	Blue-ocean Strategy	●			
1.3	80/20 Rule				●
1.4	Over-design				●
1.5	Purchase/Add-value	●			
L2	Forecasting (+10%)				
2.1	Produce > Sales				●
2.2	Sales > Produce				●
2.3	Overtime Rate	●			
2.4	Idling Capacity		●		
2.5	Just-In-Time (JIT)		●		
L3	Men & Materials (-10%)				
3.1	Idling Human Resources				●
3.2	Unfit Human Resources	●			
3.3	Expensive Purchases				●
3.4	Cost of Men/Materials				●
3.5	Plan at 101%				●
L4	Utilities & Tax (-20%)				
4.1	Water + Sewage		●		
4.2	Electricity + Aircon		●		
4.3	Gas + Heating		●		
4.4	Telecom & Internet		●		
4.5	Tax Reduction				●
L5	5-R for Machines & Materials (-10%)				
5.1	Refuse			●	
5.2	Reduce				●
5.3	Re-use		●		
5.4	Re-cycle		●		
5.5	Replace		●		
L6	Total Preventive Maintenance (-10%)				
6.1	Breakdown			●	
6.2	Spare equipment			●	
6.3	Maintenance Staff			●	
6.4	Obsolete			●	
6.5	Maintenance is Free	●			
L7	Flow Methods (+10%)				
7.1	Bottleneck				●
7.2	4-M Co-ordination		●		
7.3	Non-stop Flow				●
7.4	Delay in delivery				●
7.5	Flow KISS & Merge		●		
L8	Quality Management (-10%)				
8.1	1-10-100 Rule	●			
8.2	DIRFT	●			
8.3	5 to 6-σ				●
8.4	Don't Get, Make & Send	●			
8.5	Fool-proofing	●			
L9	Stock Control (-10%)				
9.1	Over-stock		●		
9.2	Loss stock, loss money		●		
9.3	Dead-stock is loss		●		
9.4	Poor control leads to Cheating				●
9.5	Loss sales, loss profit				●
L10	Floor & Space (+10%)				
10.1	Floor area is expensive				●
10.2	Space for storage		●		
10.3	High/Mid/Low Usage			●	
10.4	Park-like setting		●		
10.5	Happy Customer brings Profit	●			
	Total Count (=50) →	11	16	6	17

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