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UNDERSTANDING OF 5S WITHIN A JAPANESE CONTEXT: FOUNDATIONS FOR INTEGRATED MANAGEMENT SYSTEMS

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ABSTRACT

Purpose

This paper builds on previous research on the application and understanding of the 5S concept (5S). In order to gain greater understanding of 5S this research identifies and presents the key concepts from a Japanese management perspective and links these to aspects of Japanese management approaches.

Design/Methodology

Data was collected from organisational websites of Japanese companies that use 5S as a core management approach. This material was examined via the use of Computer-aided lexical analysis (Leximancer) which provides an insight into the nature 5S within a Japanese (original) context.

Findings

The research provided several findings that indicate key concepts behind the Japanese approach to 5S management. These findings demonstrate both the technical (visible) and philosophical (invisible) approaches required for each of the 5S components and are discussed in a managerial rather than cultural framework.

Practical implications

The findings are important both practically and theoretically as they provide insight into the meaning and logic that is applied to the application of the 5S management approach within its original environmental context.

Originality/value

The originality and value of the paper is derived from the holistic understanding of the application of 5S and its use as a problem solving intervention at the system or process level, which is a necessary initiating point within lean management philosophies.

Keywords: 5S, Integrated Management System, Japan, Management Philosophy

INTRODUCTION

5S is initially based on the Japanese acronym of *seiri* (organisation), *seiton* (neatness), *seisō* (cleaning), *seiketsu* (standardisation) and *shitsuke* (discipline), which are used as a platform for integrated management systems by the parallel use of total productive maintenance (TPM) [3]. In the West both 5S and TPM are sometimes disregarded or at least underutilised [11]. The major definition of 5S in the West is “housekeeping” [4][7-9][12]. A framework of

applying 5S to business was first formalised by Takashi Osada [16] in the early 1980s. The practice of 5S attempts to embed the values of organisation, neatness, cleaning, standardisation and discipline into the workplace [35]. In Japan the 5S practice was initiated in manufacturing and then extended to other industries and services. The Toyota Production System provides a well-known example of 5S principles in practice, the early version was based on 3S which then became 4S [33]. Boeing in the USA pursues 5S as a world-class strategy [2]. Even with these examples it appears that many researchers and practitioners have difficulty going beyond the concept of “housekeeping”. This is suggested by Hyland and others where they argue that Australian manufacturing firms have only a slight perception of the importance and the potentiality of 5S [18]. These authors indicate that among ten continuous improvement tools they examined, the usage and perceived importance of 5S was quite low. At the abstract level, 5S is “easy to understand” [4][12][48]. However, it seems much more difficult when one fully tries to understand the values that lie behind 5S. In addition it is also believed that some definitions may confuse practitioners [17][37], compounding the difficulty Western business has in fully appreciating the benefits of 5S.

This paper is aimed at optimising an understanding of 5S and its full potential. This can be enhanced through the understanding of the organisational and management perceptions of 5S in the originating country (Japan). Based on the previous study [25] texts from Japanese organisational websites were re-examined in depth, using computer-aided lexical analysis [24]. The result revealed some important factors in the understanding of nature of 5S. The authors suggest that these factors could be crucial for the successful implementation of 5S in non-Japanese contexts.

REVIEW OF THE LITERATURE

A Background to the concept of 5S

Understanding 5S in Japan is detailed and engrained as it stems from life wisdom and everyday practice [34]. Because of this foundation, 5S is easily included in management practice and can contribute to cost-effectiveness by maximising both efficiency and effectiveness. When understood and developed, regardless of size or type, 5S can be used to engage improvement activities within any environment including: homes, schools, communities and workplaces [10]. The implementation of 5S can also uncover hidden problems that may have otherwise remained unnoticed. Some of the important benefits of implementing 5S are summarised as:

- *Orderliness (seiri and seiton)* – to maximise efficiency and effectiveness by reducing people’s workload and human errors through simplifying processes;
- *Cleanliness (seiso and seiketsu)* – to maximise effectiveness by contributing to a healthier life, safety and wellbeing as well as enhancing transparency; and
- *Discipline (shitsuke)* – through training and education to enhance the level of morale, which leads to increased quality of work/life and work standards [35].

Within Japan it is endeavoured that the practice of 5S be integrated with another Japanese life wisdom *kaizen* (change for better) and *me-de-miru* (visual) method [26]. This integrated system of thinking or managing becomes *me-de-miru kanri*, which is a visual control system. When initially introduced as a management system in Japan, the first 3S (*seiri, seiton and seiso*) of the 5S concept received most emphasis. Given that this occurred with little prescription of the concept [41] perhaps this led to the English translation of “housekeeping”. The development of 5S from this initial starting point to the current comprehensive framework was first formalised by Takashi Osada in the early 1980s. Over this timeframe

Japanese approach to quality, just-in-time (JIT) method and TPM were developed concurrently. The KAIZEN (continuous improvement) principle was formalised by Imai [19].

As a response to these industrial developments, periodicals started compiling articles and case studies of 5S from both practitioners and industrial researchers [27]. In the 1990s this led to visual control and 5S being jointly compiled and translated into English [31]. The primary objectives of practising 5S are maximising the level of workplace health and safety and increasing productivity. A longitudinal survey by Japan Industrial Safety and Health Association (JISHA) [20] showed the development and evolution of 5S between 1945 and 1998 in relation to reducing the frequency of work incidents. The numbers, 2S, 4S and 5S, indicate the order of elements in 5S respectively (for example, 2S stands for *seiri* and *seiton*). An additional sixth S “safety” is sometimes added to promote the reduction of work injuries. The significance of implementing 5S goes beyond direct productivity, for example industrial accidents decreased noticeably during the survey period [20], shown in Table 1.

Table 1: The development and evolution of 5S

Period	Activity	Work injuries	Productivity
1 (1950-1955)	2S	44.08 (1950) 24.49 (1955)	1
2 (1956-1972)	4S	22.99 (1956) 7.25 (1972)	3.6 times up from the previous period
3 (1973-1980)	5S	7.25 (1972) 3.59 (1980)	1.4 times up from the previous period
4 (1981-1998)	6S	3.23 (1981) 1.75 (1998)	1.5 times up from the previous period

(Source: JISHA, 1999)

While the traditional Japanese understanding of 5S follows the 5 step model, there is some difference within some organisations in the elements used for 5S. For example, some organisations adopt 3S [30] whereas others implement 6S [39][48]. These variations appear to depend on the level of maturity of the 5S practice within an organisation or the emphasis on corporate objectives of the organisation along with its industrial characteristics [29]. There has also been a change in the organisational objectives of 5S. Originally elimination of waste was emphasised in Toyota production system (TPS) or “lean production” [47]. Now, quality has become the primary purpose of 5S practice for most Japanese manufacturers. This quality focus is globally accepted in conjunction with other Japanese approaches to quality [37]. Recently, because of the applicability of its tools and techniques 5S has been linked with environmental management systems (EMS) to achieve sustainability [5][45].

What the Japanese 5S entails

The original 5S has both socio-historical and philosophical roots [23]. Many practices in Japan are often denoted by *do* (way: philosophy) and *jujutsu* (techniques), such as *kendo/kenjutsu* (Japanese fencing) or *judo/jujutsu* (Japanese unarmed combat), which are intended to train the body and mind through discipline [42]. This creed is also applicable to Japanese management which encompasses both “management philosophy” and “management techniques”. An example of the former can be seen in private supplemental schools, such as The Matsushita Institute of Government and Management (MIGM) founded by Konosuke Matsushita in Matsushita Electronic Industry. They provide lectures to CEOs, politicians and economists, including management philosophy, visions, economics, policies and ethics (see <http://www.mskj.or.jp>). The 5S concept is also included with its “way of life” and

management context (MIGM graduates, personal communication, July 2006). This view is consistent with Osada’s framework [34] but has not been reflected to any extent in the English edition [35] of his work. The management techniques can be obtained at an individual basis from publications, workshops and seminars provided by management consultancy services. For example, Hiroyuki Hirano successfully promotes 5S using *manga* (cartoon comics) and audio-visual materials [e.g., 44]. This view places greater emphasis on the use of the first 2S (*seiri* and *seiton*) and its importance for corporate survival [15].

The current recognition of 5S in the western literature

While much of western literature still acknowledges 5S as “housekeeping” [4][7-9][12] or a “lean tool” [14][36], others perceive 5S as having a more strategic focus. For example, Hyland et al [18] refer to 5S as a “problem-solving tool”. Bamber, Sharp and Hides [3] suggest that 5S and total productive maintenance (TPM) can be practised not only simultaneously but also in conjunction with other process improvement methods used in total quality management (TQM), KAIZEN and just in time (JIT) methods so that organisations can take an integrated approach, which incorporates EMS. This view is empirically supported by Zutsushi and Sohal [49] who identified that there are benchmarking standards available for EMS which can be used to achieve optimum level of operations or “best practice” in Australia, as shown in Figure 1.

In practice, enormous effort may be required to achieve this integrated management system. Therefore small-to-medium organisations may resist taking this view due to economies of scale. The authors therefore recommend considering 5S in a more philosophical or at least strategic way. When 5S becomes a way of doing business, operations will need to be approached differently due to the behavioural changes required as a basis for 5S to succeed. Once all members within an organisation can fully understand and implement 5S, organisational readiness towards best practice becomes more realistic, since one of the outcome of successful 5S practice is increased morale and organisational resilience [35]. The literature [3][45] suggest that 5S contributes to the following important strategic priorities: productivity, quality, costs, delivery, safety and morale, as shown in Figure 1. Recently in western writing [45][46] there has been recognition of the potential of 5S in line with environmental management, an approach which already been exercised in Japan [5]

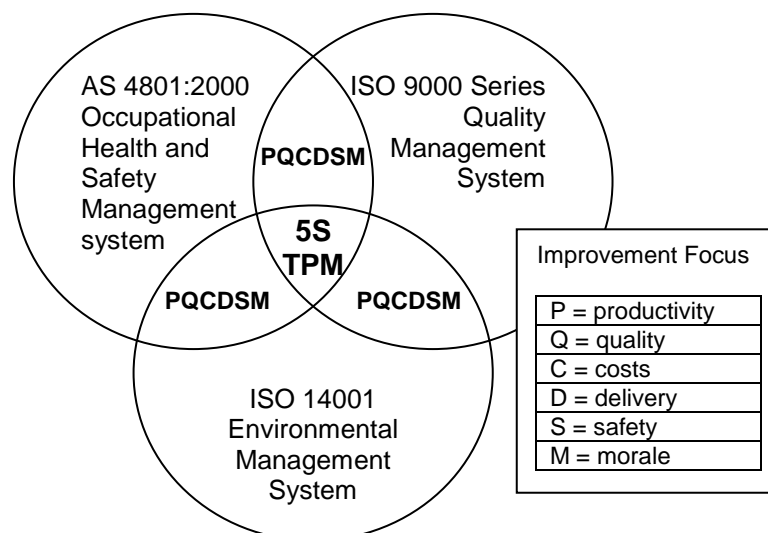


Figure 1:
The Integrated Management System (Source: [3][49])

METHODOLOGY

The literature [11][16] has suggested that 5S is still underutilised by Western organisations. Others have implied that 5S has received a focus on specific applications rather than on its holistic meaning [25]. The aim of this research was to understand the message from organisations who practise 5S in Japan its country of origin. This research looked at existing established secondary data in relation to the managerial and organisational application of 5S within Japanese businesses. Organisational websites were selected as the research frame. This is possible as messages in organisational websites are becoming dialogs which represent organisations' strategic intentions rather than just as a marketing device [13][21][22]. Corporate websites are now an important primary sources of information in relation to that organisation [1][32]. This study also sought to ascertain keywords commonly used by organisations. Therefore, the approach reflects that of a case study investigation of messages from Japanese 5S practicing organisations.

Eighty-four Japanese organisations which publicly describe 5S on their organisational websites were purposively sampled. Based on previous research in this area [25], both accessibility checking was conducted, followed by a test-retest reliability checking before analysis. Computer-aided lexical analysis [24] was used for this study, which enabled triangulation of the data set. Leximancer Version 2.2, was used as a data analysis tool, its learning capability generating and putting similar words into groups automatically as synonyms, then representing them as a "concept" [38].

In computer-aided lexical analysis, each word forms the unit of analysis [28]. The initial execution of Leximancer identified 21 concepts by generating a number of words. The number of concepts to be considered by Leximancer was increased incrementally and the program again executed. This was continued up to a setting of 40 concepts. After these iterations it was observed that no new concepts above 31 were evident; therefore the concepts identified in the analysis were deemed to be saturated, as proposed by Strauss and Corbin [40]. All 84 pages were used for the analysis. A feature of Leximancer is its ability to display concepts and the relationships between them, in a conceptual map. The type of mapping selected was 'linear' which emphasises co-occurrence between concepts [38].

Content validity, the accuracy of translation, was checked using Brislin's [6] back translation method. In the previous study [25] all the pages were independently translated into English and content validity was conducted by the use of both a Web translation service and a verification sample of these translations was assessed by an independent translator. Data which contained industry-specific terminologies were confirmed by another translator to assure accuracy. As consequence of these validity checks, some modifications in assigning words were made. The term *organisation* was replaced to either *company* or *arrangement* to avoid confusion in its meaning (eg the organisation component of 5S rather than the business form). As most Japanese put the first S *seiri* and the second S *seiton* together in use as an idiom, which appeared significantly in the previous studies, the concept *arrangement* was manually assigned to represent these two elements altogether. The third S *seiso* and fourth S *seiketsu* were assigned as *cleaning* for the same reason.

FINDINGS

The 5S as a means of management

The most frequently occurring concepts were: *cleaning* (*seiso* and *seiketsu*), *improvement* (*kaizen*) and *arrangement* (*seiri* and *seiton*). All three concepts were strongly linked to each other, followed by *place*, *management* and *activity*. The fifth S *shitsuke* was emphasised as *training* which was linked to the concepts of *method* and *workplace*. Table 2 shows the 31 concepts extracted from Leximancer.

Table 2: The list of concepts regarding 5S appeared in the Japanese context

Concept	AC	RC	Concept	AC	RC	Concept	AC	RC
cleaning	176	100.0%	order	87	49.4%	profit	50	26.0%
improvement	170	96.5%	business	84	43.7%	standard	48	25.0%
arrangement	156	88.6%	enterprise	74	38.5%	fixed	44	22.9%
place	154	87.5%	company	73	38.0%	small	40	20.8%
management	132	75.0%	person	72	37.5%	machine	39	20.3%
activity	118	67.0%	fact	68	35.4%	customer	37	19.2%
time	100	56.8%	work	59	30.7%	equipment	36	18.7%
method	98	55.6%	factory	57	29.6%	information	36	18.7%
training	93	52.8%	addition	57	29.6%	plan	33	17.1%
workplace	91	51.7%	production	50	26.0%	participation	31	16.1%
						maintenance	30	15.6%

Note: AC: absolute count; RC: relative count

The proximity of concepts in the cluster map was derived from a combination of the direct and indirect relationships between those concepts listed in Table 1. The cluster map only displayed the higher levels, that is the more abstract concepts. It can be seen that there are several clusters which can be grouped as: (a) *standard-cleaning-activity*; (b) *machine-improvement-management*; and (c) *plan*, as shown in Figure 2.

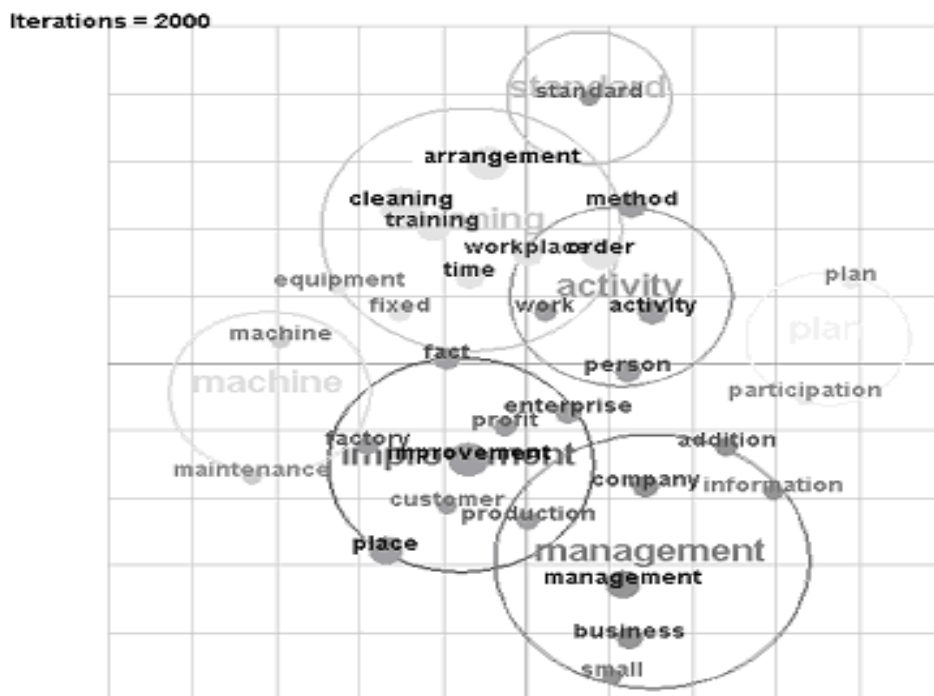


Figure 2: The conceptual map of 5S in the Japanese context

When looking at co-occurrence, the concepts of *cleaning*, *arrangement* and *training* were linked to each other. Another frequently occurring concept of *improvement* was linked to *place*, *cleaning*, and *activity*, followed by *arrangement*, *training* and *management*. The concept of *place* mostly included the word “genba” (shopfloor); organisations investigated often expressed this as “(immediate/actual) place of management”. The concept of *improvement* included both the words “efficiency” and “effectiveness”. However, the word “efficiency” was related mostly to the concept of *production* whereas the word “effectiveness” was linked to the concept of *management*. Japanese organisations clearly perceived 5S as a holistic, stand-alone management method for workplace improvement. Also, inclusion of concepts such as *machine*, *equipment*, and *maintenance* was related to the TPM practice. These results support the literature [3] that 5S can be a platform for an integrated management system (IMS). The concept of *standard* included expressions such as “5S is the foundation for constructing international standards into management systems” and “continues this standard with actions”. The evidence supports the proposition that 5S can fit well with ISO or OHS (AS 4801 in Australia) standards [49].

The current intentions on 5S from the Japanese cases

Organisations which described 5S on their websites are shown in Table 3. Manufacturing organisations included automotive-parts manufacturers, food producers, and chemical producers. Service organisations included employment agencies, management consultancies and training providers. We separated the third category since it included schools, management associations, management communities, and city councils.

Table 3: The list of concepts regarding 5S appeared in the Japanese context

Cases	Count	Percent
Manufacturing	25	29.8
Service	37	44.0
Education/Non-profit/City council	22	26.2
Total	84	100.0

When looking into individual cases, the manufacturing sector seemed to be major 5S practitioners whereas service organisations tended mainly to act as 5S trainers. The other organisational sectors were a combination of both 5S trainers and practitioners. Technical colleges provided both the concept and implementation methods of 5S. They implemented 5S and informed their 5S experiences. Non-profit organisations (management associations and communities) provided places where 5S practitioners conduct meetings to exchange their information regarding their workplace management including discussions on current 5S practices. Their main emphasis was “5S is primary for improvement”. City councils were aligned with training providers to offer 5S workshops mainly for small sized organisations at affordable prices, and some were free.

On the trainers’ side, organisations explained the meaning and importance of 5S and provided some examples of 5S implementation. On the practitioners’ side, organisations provided their current practice with photos, pictures and diagrams. This study did not extract the details of those additional materials. Some organisations used their websites as newsletters to communicate with their customers. Others provided company audits to inform current levels of their 5S implementation. Education/non-profit/city councils provided mixed information. As an exceptional case, Numazu City Council (case 68) incorporated 5S into their policy and informed the reader of their current 5S practice, then explained how the council can provide

better services to their citizens using the 5S principle. It also provided a dialog-style checklist which linked to workplace health and environmental management.

DISCUSSION

Research outcomes

Within the study a major emphasis of Japanese organisations appeared to be “to create a better workplace”, implying that Japanese organisations take a more holistic view of 5S. In the Japanese context 5S was not only a focus internally to the companies themselves, but also was outwardly focused toward customers. This result is supported by Osada [35] that 5S enhances transparency. Through the use of general and easy to understand terms on their websites the Japanese’s organisations indicated that promoting 5S practice was aimed at communication with their customers as well as employees.

Whilst manufacturers actively practiced 5S, service organisations did in limited ways, implying that service firms appear to be at an earlier maturity level in practice; as seen in the early stage of the manufacturing counterparts. Commonly used terms in the western literature such as “housekeeping” [4][7-9][12] or “lean tool” [14][36] did not appear in this study of Japanese’s organisation, supporting a different focus and understanding in Japan. Also, abbreviations such as TQM, JIT and TPM were included and integrated into 5S by the subject organisations.

This study could not find terms such as “employee involvement” or “employee empowerment” as suggested in the western literature. This can imply that total participation emphasised by Japanese organisations could have a stand-alone meaning. The research suggests that total participation in Japan is a more voluntary-based approach in terms of “autonomy”, which has little mention in the “lean” literature but does occur in TPM. To this end, Suzuki [43] claims that autonomy can be enhanced by 5S as well as the reverse that successful 5S can be achieved by enhancing autonomy. Thus, within the Japanese context autonomy and 5S can be both means and ends and are already integrated concepts. In order to achieve the IMS, enhancing autonomy would appear to be the one of critical factors in the successful implementation of 5S.

This study provides a platform through theoretical linkage for further and deeper investigations that are currently being undertaken. As the study was aimed at identification of key concepts it has been kept at a global level. Further analysis of subject organisations at an individual level will be forth coming. Further studies will also include analysis of material other than text, such as the many visual materials identified as important in the Japanese presentation of 5S—photos, diagrams, models, charts etc. This common approach in Japan stems from the use of *me-de-miru* (visual) methods and is used to express 5S practices.

Practical outcomes

Gaining an understanding of the complexity and deeper requirements of 5S from a Japanese perspective is a valuable source of information in terms of its application within other managerial settings. By studying the context of 5S, within a Japanese management setting, it appears that 5S is intended to provide a mechanism for improving the workplace with minimal costs. The adoption of 5S also appeared to be well suited to applications within production firms as it provides a platform that with little effort allows the organisation to satisfying various international standards with minimum costs.

There is evidence that 5S is also applicable for service industries, schools, and communities, and situations where environmental management is a primary concern. Although this study did not focus on the aspect of how to implement 5S, the use of *me-de-miru* (visual) methods could be the success factor for the 5S application.

CONCLUSION

Japanese organisations see 5S as a means of an approach to management rather than a tool within a management portfolio of tools. This is shown by the conceptual map with the four key areas being management, activity, training and improvement. These four areas provide action for managerial application of the 5S management approach. The concept map places the concepts of machine and maintenance to the side of the linkage between the above four key activities of management, activity, training and improvement, with these main activities leading to the concept of standards. These includes plans which demonstrate that the associated outcomes of the core factors associated with management intent are standards, plans participation and machines (maintenance). This deeper understanding of 5S and its associated intent builds a culture leading to a management strategy, which sees its application presented in the form of an Integrated Management System. An important point for consideration was the successful uptake of 5S, this seemed to occur only when the benefits of 5S are fully appreciated within this holistic management perceptible. As 5S stems from life wisdom, and the deeper understanding of 5S at an abstract level, its application is difficult as it requires the actual development of the wisdom rather than an abbreviated summary of some of the concepts in the terms of management tools. It is this deeper wisdom that will allow the Western businesses to develop 5S to the levels of managerial application seen within this study, rather than simple tools for ordering the workplace.

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