A Lean Thinking Approach to Safety in Schools

Pachernwaat Srichai, Pitipong Yodmongkol, Pradorn Sureephong and Komsak Meksamoot

College of Arts, Media and Technology, Chiang Mai University Thailand

Abstract. Effective safety is vital to a school's reputation and the overall achievement and educational quality a student receives. Managing safety at school is the responsibility of everyone, but is commonly seen as an expensive and bureaucratic process, with low efficiency in terms of safety improvement. This paper suggests a Lean thinking approach could be utilized to cut waste and improve safety and presents a case study at a private school in Thailand. Results are preliminary, showing an assessment of the current safety situation in the school. The paper concludes by proposing a conceptual framework based Lean principles to improve safety and related processes.

Keywords: School Safety, Lean thinking, Thailand, Process Improvement

1. Introduction and Background

Effective child safety is vital to a school's reputation (CPCR, 2007), and ultimately to students achieving their educational potential. Despite this, school safety is often seen as a challenging mix of wasteful protocols and expense. Bureaucracy, inefficiency and costs are commonly associated with managing and improving safety, and this is particularly so for schools, where time and budgetary constraints put pressure on organizational processes. These issues are exacerbated by the intangible aspects of effective child safety, and the often indeterminate cost benefit ratio of implementing safety related suggestions. In Thailand, where frameworks and policies for child safety are still developing, one of the most common issues is schools becoming overwhelmed with ideas and suggestions regarding child safety. This paper proposes a new approach to manage school safety issues using philosophies and principles of Lean thinking. The paper leverages a case study from a school in Thailand to show how Lean thinking might be utilized to develop a new system for managing child safety in schools.

1.1. Child Safety in Schools

Child safety refers to a state where there is no threat or danger to a child within the home or at school (Action for Child Protection, 2003). Schools represent an environment fundamentally envisaged for children and child safety in schools has therefore been an issue of worldwide debate (Benbenishty & Astor, 2008). In promoting school safety, focus should be on ensuring physical wellbeing, environmental hygiene and road safety. If these factors are fulfilled, schools might be judged as providing a safe environment (CPCR, 2007).

Literature shows school safety is a significant issue and in response to this, a well-developed health and safety culture has emerged in many countries (Health and Safety Commission, 1993). Despite this, while child safety is of concern in Thailand, there is no formal framework for dealing with safety in schools and it therefore represents an emerging issue in Thailand. A survey involving schools in Bangkok reported that 90% of parents see child safety as a critical issue (CSIP, 2007) and school safety can be considered integral to improve school quality (e.g. Furlong & Morrison, 1994). As well as safety issues *per se*, schools must also consider potential loss of parent satisfaction and trust associated with safety, which can be difficult to regain if lost. For private schools, this may result in fewer students, and could affect financial sustainability. This is corroborated by research illustrating that school safety varies considerably among different school types (Laflamme & Menekel, 2000).

To avoid problems caused by child safety, school administrators often use a system to elicit suggestions from stakeholders for the purposes of improving child safety and parental trust. As a result, school administrators identify safety issues and find appropriate solutions. Collecting suggestions from parents allows schools to address their concerns and action their suggestions; however addressing school safety also has significant limitations. Some suggestions are expensive in terms of time and effort for implementation and require the involvement of key school stakeholders (teachers, staff and parents). Addressing child safety

can also be a costly endeavor; data drawn from various sources showed the estimated cost of child safety in the US was $103.8 billion in 2007(Wang & Holton, 2007). In addition, money, time and effort may have no impact in terms of solving school safety issues. Implementing a safety suggestion system based on the principles of Lean thinking therefore has potential to improve child safety in schools.

1.2. Lean thinking and reconfiguring organizational processes

Lean thinking is a methodology and philosophy originating in the Japanese car manufacturing industry to provide a focused approach for continuous improvement (Womack & Jones, 1990). More recently, the term 'Lean thinking' has been recognized to signify a shift in the application of Lean, from solely manufacturing, to a more general philosophy, which can be applied to improve service and quality in any organizational process. Lean thinking is a process reengineering methodology (Radnor, 2010) and in considering Lean for process reconfiguration, research found the American health care system facing poor coordinated processes and enormous waste (Dart, 2011). The application of Lean thinking to health care systems is a common theme in the literature (e.g. Chalice, 2007), with enhanced patient care and decreased costs being common tenets of such research. The primary philosophy of Lean involves eliminating waste and unnecessary actions, and linking all steps that create value (Womack & Jones, 1996). Examples of Lean thinking utilization in the health care sector, and the general principles of eliminating waste and improving customer satisfaction suggest Lean thinking is well suited for application to safety in schools.

2. Case Study and Methods

2.1. Case Study

To test the application of Lean thinking to school safety, a case study was utilized within a private school in northern Thailand. The school runs kindergarten and primary level education programs, with 1,260 students on roll (410 kindergarten and 850 primary students), and 97 teachers and staff. The school is well known among parents in its catchment area, and has been operational for 25 years. When choosing a private school, parents visit to explore, search for information about education management and pay considerable attention to safety (Trump, 2012). The school selection process within the private education sector thus provides a financial impetus to ensure safety.

2.2. Method

This research is currently in progress, and at a conceptual rather than completed stage. There are four methodological steps in applying Lean to school safety, as shown in Figure 1. This paper outlines the first three steps, with the fourth step being the domain of future work. Each step was associated with the five key principles of Lean, as identified by Womack and Jones (1996). These five key principles were split into key practical steps, as exemplified by the healthcare literature (e.g. Radnor et al., 2012). The steps were:

Identification and Assessment: Identifying the value of safety derived by customers (the students).

Assessment: Identifying existing waste and inefficiency.

Improvement: Designing a framework to challenge waste, standardize according to best practice, innovate and focus to banish waste and inefficiency.

Monitoring (future work): Measure and analyze performance to check and continuously improve it.
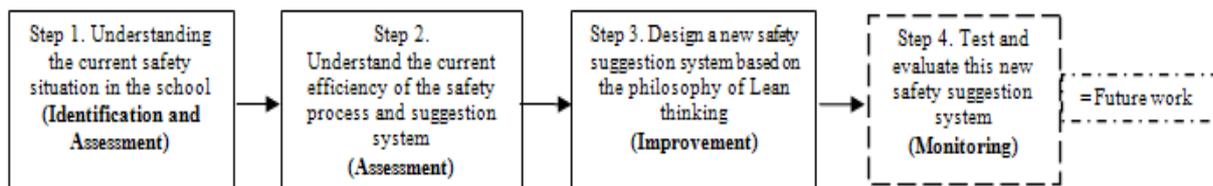

Figure 1: Steps to apply Lean thinking to school safety.

Step 1: This step identified and assessed the value of safety as derived by customers (students) to understand current inefficiencies and waste in the process of managing school safety. The current safety situation was assessed by investigating the number of accidents or injuries occurring in the school. In this

research, the meaning of safety is split into three aspects (physical wellbeing, environmental hygiene and road safety). Data were collected from the school's accident record over three semesters (2nd semester 2010, 1st semester 2011 and 2nd semester 2011). The objective of collecting such data was to understand the current status of safety to gain insight into the significance of safety at the school, and to provide a benchmark against which a future Lean implementation can be measured in terms of its effectiveness.

Step 2: This step assessed and understand the waste and inefficiencies related to the current suggestion system for school safety. In the case study, the safety suggestion system is considered the primary mechanism for managing and improving safety and was thus the focus for Lean implementation. This step gathered data using records over the same three semesters defined in step 1. To implement Lean thinking within the school suggestion system, there was a need to understand current costs, waste and inefficiency, therefore a crucial part of the data collection at this stage was also interviews with staff and teachers.

Step 3: Improvement to the safety suggestion system required design of a new system based on Lean thinking principles. This in turn required a review of appropriate literature, and assessment of Lean thinking to understand how the current situation of child safety and the suggestion system itself could be improved. Lean principles strive to eliminate waste, minimize inventory, maximize flow, pull production from customer demand, achieve customer requirements, do things right the first time, empower workers, design for rapid changeover, team-up with suppliers, and create a culture of continuous improvement (Womack & Jones, 1990). In transposing these principles to school safety, the main goal becomes eliminating waste, and in this study, Lean is used to filter safety suggestions solicited from different stakeholders at the school. The three key principles of Muda, Muri and Mura (described in section 3.4) are therefore integrated into a proposed Lean framework to improve the school's safety suggestion system.

3. Results and discussion

3.1. Current safety situation (Lean principle: Identification and Assessment)

In the 2nd semester 2010, there were 22 cases relating to physical wellbeing, 8 cases of environmental hygiene and 0 cases of road safety. In the 1st semester 2011, there were 40 cases related to physical wellbeing, 2 cases of environmental hygiene and zero cases of road safety. In the 2nd semester 2011, there were 19 cases of physical wellbeing, 6 cases of environmental hygiene and 0 cases of road safety. Over three semesters, a total of 97 incidents occurred, given the number of students, the overall accident rate was 7.6 %.

3.2. Effectiveness of the current safety suggestion system (Lean principle: Assessment)

Parents and staff currently send their safety suggestions via the channels provided, which are face to face, telephone, e-mail, letters and Facebook. The current suggestion system and its success rate for the three semesters is outlined in Figure 2.

Source of Suggestions	Channels	Total suggestions	Successful suggestions	Success rate (%)
Parents (974)	Face-to-Face	277	94	34
	Telephone	331	94	28
	E-mail	148	54	36
	Letter	57	17	30
	Facebook	161	64	40
Teachers/ Staff (903)	Meeting	351	104	30
	Web-blog	178	66	37
	Telephone	114	49	43
	E-mail	94	22	23
	Letter	24	2	8
	Facebook	83	30	36
	Suggestion cards	59	20	34

Figure 2: Safety related suggestions and success rate over three semesters

The average success rate for all channels over the three semesters is 31.5 %. This is relatively low, and indicates the majority of safety related suggestions are unsuccessful, which underlining the current

inefficiency and barriers to implementing successful safety measures in the school. More importantly, it highlights inefficiency in processing the large numbers of suggestions elicited from different channels and sources.

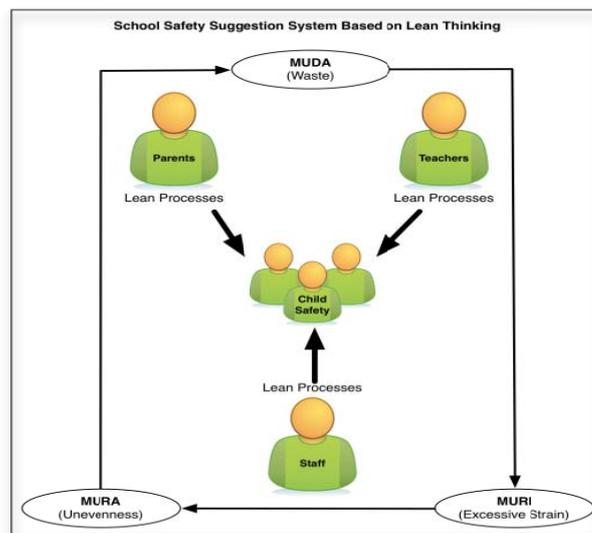## 3.3. Proposed framework using Lean concepts (Lean principle: Improvement)

Figure 3: Proposed framework for Lean Child Safety Suggestion Management.

The proposed Lean framework (Figure 3) is based around the three principles of Muda, Muri and Mura. Muda refers to waste and is thus the central principle of Lean (Weigel, 2000). Muda as applied to school safety, is eliminating wasteful activities, and more specifically eliminating waste in the safety suggestion system by reducing down the number of suggestions, which have no impact on safety. This will be achieved through the application of Mura, a Lean concept associated with unevenness (Weigel, 2000). Reducing unevenness means standardizing, and making processes efficient. As applied to school safety, Mura will aim to standardize the process of eliciting suggestions as well as the efficiency and methods of sorting useful suggestions from those with no apparent safety benefits. Lastly, the framework considers Muri, the third component of Lean thinking, and associated with excessive strain. As related to school safety, Muri is applied to distinguish feasible suggestions based on difficulty of implementation in terms of the effect on workload (Ehab & Salim, 2010). To implement the framework, a team or committee will then be identified. Rules and regulations will be established and everyone in the organization must be informed of the Lean suggestion system (Liker, 2004). Next a system should be set up to gather and record ideas and the committee will analyze all suggestions according to Lean principles.

4. Limitations and Future work

Applying a philosophy originating in the car manufacturing industry to a school environment may seem misguided or inappropriate, but the auto industry has been, and remains fundamental, not just to how manufacturers create things, but the way organizations and society operate in terms of living, working, and thinking (Womack & Jones, 1990). Adapting and transposing Lean thinking to a school environment is challenging, as is the genesis and implementation of the Lean framework. However, initial results and further development of the approach suggest school safety is an area which could benefit considerably from Lean thinking, particularly in Thailand where little government guidance exists on safety in schools, and particularly in the private education sector where safety can also determine the financial health of a school. The research presented so far is conceptual, with future work moving towards practical implementations.

5. Conclusion

This study has presented preliminary research and highlighted potential for the application of Lean thinking to school safety. The research initially aimed to understand current safety management of a case study in a school chosen, followed by identifying current inefficiencies of the suggestion system and finally proposing a new safety suggestion framework based on Lean thinking principles. Data was collected from

the school's accident books and records of suggestions over three semesters together with staff and teacher interviews. Results showed incidents affecting child safety in the school, but more importantly, revealed suggestions offered by parents and other stakeholders were inefficient. Future work will focus on implementation of the Lean safety management system and monitoring the proposed framework to continuously improve safety suggestions and ultimately enhance safety in schools.

6. Acknowledgments

7. References

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