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Methodology for baseline study - Project: Productivity and occupational health and safety in the garment industry in Bangladesh (POHS-BD)

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Publication date: 2016

Document Version Publisher's PDF, also known as Version of record

Link to publication from Aalborg University

Citation for published version (APA):

Hasle, P., Maalouf, M., Vang, J., Amanullah, M., Morshed, M. S., Baral, L. M., Hoque, I., Hamja, A., & Latif, M. A. (2016). *Methodology for baseline study - Project: Productivity and occupational health and safety in the garment industry in Bangladesh (POHS-BD)*. Aalborg Universitet.

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Methodology for baseline study

Project: Productivity and occupational health and safety in the garment industry in Bangladesh (POHS-BD)

Final version: 31 October 2016

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Publisher: Department of Materials and Production, Aalborg University, ISBN 978-87-971394-1-7

The report and the POHS-BD project is funded by the Danish development cooperation (Danida), project no. 14-07AAU

Contents

1	Introduction	4
2	Design	6
3	Development of methodology	8
	3.1 Selection of relevant maturity models	8
	3.2 The Occupational Health and Safety Maturity Model	8
	3.3 The Productivity Maturity Model	12
	3.4 Selection of companies	15
	3.5 Expert testing	16
	3.6 Pilot testing	16
	3.7 Training of researchers	16
4	Data collection in companies	18
	4.1 Introductory visit	18
	4.2 Main data collection	19
	4.3 Follow up visit	20
5	Data analysis and report writing	21
	5.1 Writing detailed summaries of all interviews and observations	21
	5.2 Data entry of all quantitative data in spread sheet	21
	5.3 Scoring of all scales and maturity level	21
	5.3.1 Aggregate assessment example	21
	5.4 Writing a narrative report	21
	5.5 Validity, Reliability and Quality Control	22
Ap	pendices	23
	Appendix 1: Basic company information	23
	Appendix 2: Interview guides and templates	27
	Appendix 2.1 Interview checklists	
	Appendix 2.2 Interview sheet	
	Appendix 3: Observation guide	34
	Appendix 4: OHS Maturity Level Assessment	
	1. Leadership Commitment and Communication	
	2. Business Policy	
	3. Relation with contractors	
	4. Relation with buyers	40
	5. Objectives, Targets & Performance Measurement	41
	6. Training	42

	7.	Workforce Involvement	3
	8.	OHS structure and accountability for OHS results4	5
	9.	Accident Investigation	6
	10.	Unsafe Behaviors and Unsafe Work Conditions4	7
	11.	Legal requirements, Auditing and Reviews4	7
	12.	Industrial relations, Welfare and Job Satisfaction4	8
	13. So	coring sheet	0
	Apper	ndix 5: Productivity Maturity Level Assessment	1
	1.	Leadership commitment	1
	2.	Employee involvement	2
	3.	Training	3
	4.	Continuous improvement	4
	5.	Value stream mapping	5
	6.	Control through Visibility	6
	7.	Accounting support to Productivity	7
	8.	5S/Housekeeping	8
	9.	Preventive maintenance	9
	10.	Structured Flow/Pull Manufacturing	0
	11.	Suppliers and customers' relationships	2
	12.	Scoring sheet	3
	Apper	ndix 6: Template for company report6	4
	Apper	ndix 7: Procedure for uploading data6	6
	Apper	ndix 8: Checklist and manual for quality control6	7
Refe	erences	5	9

1 Introduction

The project aims to create knowledge regarding sustainable co-development between productivity and occupational health and safety (OHS) in the readymade garment (RMG) industry in Bangladesh. As such, this project aims to directly and indirectly improve productivity and OHS practices among Bangladeshi companies. The companies are considered motivated to implement OHS improvements as they simultaneously experience productivity gains. OHS is thereby transformed from being a cost to becoming a means for productivity growth.

The aim of the baseline study is to gain knowledge of the present level of productivity and OHS maturity of the RMG firms, their development needs and their experience with integrating productivity and OHS as well as relations with the external buyers. The capability maturity for productivity is based on continuous improvement maturity assessment and Gartner's capability model from the extant continuous improvement and lean literatures (Womack, Jones and Roos, 1990; Womack and Jones, 2003; Melenovsky and Sinur, 2006; Bessant and Francis, 1999). The maturity assessment encompasses both technical and organizational/behavioural dimensions with special attention to institutionalizing practices. The model allows organizations to identify their current level of maturity and devise the actions needed to progress to the next maturity level. It is here applied by the researchers. The model consists of five levels ranging from ad hoc application of productive practices over codification and embedding of practices to systematic continuous improvement of practices. The organizational health and safety maturity assessment is based on the extant safety literature (Parker, Lawrie and Hudson, 2006; Dejoy, 2005). Parker et al.'s model has been used to describe the safety maturity related to culture and management system in many industries including oil, aviation and healthcare. Hudson's model illustrates a five step progression from a "pathological" stage where there is a "no care" culture and "no systems" through to a "generative" stage where managing risks is a way of life and fully integrated systems are effectively in place.

The baseline study is conducted in 50 RMG firms constituting large, medium and small firms. The firms are identified through the so-called snowball technique from industry stakeholders (i.e. BGMEA, BKMEA) and from AUST University in Bangladesh. The learning from the baseline study is used to identify areas for improvement which will feed the next step of the study. The next step aims to intervene in 12 companies in order to elevate the current maturity level of the 12 companies

to at least one level above. This step also entails devising a tool to identify sub-optimal situations in practice. The interventions are designed in detail for each maturity level.

2 Design

When looking at an organization and its activities, three main components can be identified: 'structure', 'processes', and 'culture' (Antonsen, 2009; Guldenmund, 2010). Organisational structure is about the formal aspects of an organization. It is not only about the infrastructure and hardware, but also about the distribution of tasks, roles and responsibilities, control, and authority (power). Structure thus determines how the organizational mission should be achieved, and by whom (Guldenmund, 2010, p. 85).

Organisational processes refer to the core business and supporting processes in an organization. These also comprise management processes and systems, as well as the social/interactional processes i.e. everything that relates to social relationships, communication, and exchange of information between the workers in an organization. These interactional aspects can be seen in features like cooperation, trust, competition, or conflict (Antonsen, 2009, p. 45).

Organisational culture, or corporate culture, applies more to the informal aspects of work and organising. It is about what people in an organization value as important, and about their underlying common beliefs and convictions. Organisational culture is often described as "the way we do things around here" (Guldenmund, 2010, p. 21). There is not just one overall culture within an organization. Several (sub) cultures can co-exist, typically linked with different units, departments, hierarchical layers, and occupations. These cultures within an organization are not isolated but are obviously affected by the national culture, and specific characteristics from a country, region, sector, industry, or occupation (Antonsen, 2009).

In order to analyse and better understand OSH and Productivity within an organization, the organizational triangle model (structure, processes, culture) and the interrelated perspectives of the three organizational dimensions are taken into consideration. Take, for example, an industrial company, one of whose employees has experienced a serious accident. The investigation following the accident reveals that some minor incidents preceded this accident. These 'near-misses' were, however, not reported to the line management, and did not lead to any appropriate measures that could have reduced the risk of the accident happening. From the processes perspective, it could be argued that there was a lack of communication on safety issues. Poor communications on safety issues could also be related to structural factors in organizations e.g. because line managers, supervisors, and/or workers are not aware of their specific role and responsibilities related to safety. The problem could also lie in the "softer", cultural aspects of the organization. Working safely and preventing accidents may not form part of the company's value system, leading to an atmosphere of non-compliance with good operating practices, poor safety communication and failure to take effective action to remedy safety and health problems.

As for the assessment of an organization maturity levels for OSH and Productivity, it is important to note that while structures and processes involve concrete elements, culture involves abstract elements related to attitudes and behaviours. These abstract and soft elements pose extra challenges for the assessment of both OHS and productivity maturity. In order to capture these complexities associated with culture assessment, scholars have recommended the combination of different and reinforcing approaches. For instance, Guldenmund (2010, pp. 183 ff., p. 197) distinguishes respectively the analytic (psychological), the pragmatic, and the academic (anthropological) approach to the study of occupational safety culture (Table 1). In this baseline study, we rely on the academic and pragmatic approaches for assessing the maturity levels of safety and productivity of the companies.

Table 1: The analytic	, academic and	pragmatic approach	towards safety culture
-----------------------	----------------	--------------------	------------------------

Main approach	Time focus	Information aimed to retrieve	Research cha- racteristics	Assessment strategy and methods
Academic (anthropologi- cal)	Past	Qualitative information	Descriptive	Fieldwork, ethnographical-inspired methods (e.g. document analysis, ob- servations, focus groups, interviews, etc.)
Analytical (psychologi- cal)	Pre- sent	Quantitative infor- mation, on the safety climate	Descriptive	Safety climate scales, questionnaires
Pragmatic (experience based)	Future	Safety culture maturity (level)	Normative, pre- scriptive	Behaviourally Anchored Rating Scales

Source: based on Guldenmund (2010, pp. 183 ff., p. 197).

3 Development of methodology

3.1 Selection of relevant maturity models

Assessment tools are critical to the success of continuous improvement of productivity and OHS — or in the successful implementation of any world class manufacturing principles for that matter. Assessment tools have many functions, most important perhaps as a "roadmap" that illustrates the company's current status among its most important performance parameters. A good assessment is also invaluable in identifying opportunities for improvement and the parameters in which action plans should be designed. For an assessment tool to fulfil these functions, it must accurately reflect the nature and complexity of what is being assessed.

In this study, the development of the methodology started with a review of the maturity assessment models related to OHS and lean/continuous improvement available in the extant literature (Hudson, 2001 & 2003; Bessant et al., 2001; Jorgensen et al., 2007). It was not possible to identify one model that fits perfectly the needs of this project. Based on this, we have drawn upon existing maturity assessment models for safety and lean/continuous improvement. In addition, stakeholders in the garment industry in Bangladesh have been interviewed as well as selected garment companies visited. The models of this study were built with more focus on the concrete elements and less emphasis on the abstract elements of the organizations which is considered more suitable for organizations with varying levels of OHS and productivity maturity - as it is the case in Bangladesh RMG industry.

3.2 The Occupational Health and Safety Maturity Model

The models of maturity assessment available in the extant literature focus on the assessment of the traditional safety culture, but lack the dimensions for health assessment dimensions. One famous model is depicted in Figure 1, which illustrates a five step progression from a "reactive" stage where there is a "no care" culture and "no systems" through to a "generative" stage where managing risks is a way of life and fully integrated systems are effectively in place. This model is strongly inspired by the five- stage model of Hudson and colleagues (Hudson, 2001; Hudson, 2003; Parker et al., 2006). Since our research interest is to investigate both health and safety maturity, we have built on this model by adding the health features for each stage of maturity.



Figure 1. The Health and Safety Maturity model

The descriptions of each stage of OHS maturity model are given below.

Reactive:

Organizations act only action after incidents. At this stage an organization sees OHS as an external requirement, and not as an aspect of conduct that will allow it to succeed. The external requirements are those of government, the legal framework and the regulatory bodies. There is no awareness of the behavioral and attitudinal aspects of OHS. OHS is seen as a technical issue, to be achieved by compliance with rules and regulations.

Some characteristics of an organization in this stage are:

(1) Problems are not anticipated, and the organization reacts to each one as it occurs.

(2) Communication between departments and functions is poor.

(3) Collaboration and shared decision-making is limited.

(4) People who make mistakes are blamed for their failure to comply with the rules.

(5) There is not much listening or learning inside or outside the organization, which generally adopts a defensive position when criticized.

Formal:

An organization at this stage considers OHS to be an organizational goal, even in the absence of external requirements. Strategy and mechanisms for compliance are in place with little impact on daily operations. OHS involves some collection of data. OHS is still primarily driven by management and imposed rather than looked for by the workforce. Although there is growing awareness of behavioral issues, this aspect is largely missing from OHS management, which generally concentrates on technical and procedural solutions.

Some characteristics of an organization in this stage are:

(1) Strategy and practices for OHS improvement have been introduced to the company with yet little effect on daily operations

(2) Management's response to mistakes is to introduce more controls and procedures, and to provide more retraining.

(3) The relationship between employees and management is adversarial, although there may be more opportunities to discuss common goals.

(4) The organization remains reactive in relation to problems, although there may be more anticipation of potential problems in planning.

Deployed:

The implementation of the OHS compliance is now a part of the organization's strategy and projects and activities are planned on the basis of established goals and objectives. Knowledge of and practical

experience with improving OHS are acknowledged and recognized in the organization, although initiatives are still focusing on pressing issues. Satisfactory performance improvements are achieved. Specific HR systems (i.e. selection, compensation, training functions) are aligned with OHS compliance objectives. Some characteristics of this level are:

- 1. The role of management is to make sure that goals are achieved and that work objectives are clear to employees.
- 2. The organization is willing to learn from external groups, especially new techniques and best practices.
- 3. The interaction of people and technology is considered, but more from the viewpoint of increasing the efficiency of the technology.
- 4. There is more teamwork.
- 5. There is growing awareness of the impact of cultural issues in the workplace, although it is not understood why added controls and training have not yielded the expected safety improvements.
- 6. Management encourages interdepartmental and inter-functional communications.

Autonomous

Workforce involvement starts to move the initiative away from a purely top down approach; however top management still plays a role in leading the improvement of the health and safety management system. An organization in this stage has adopted the idea of continuous improvement and applied the concept to safety. There is a strong emphasis on communications, training, management style and improving efficiency and effectiveness. People within the organization understand the impact of cultural issues on OHS.

Some characteristics of an organization in this stage are:

- 1. Problems are anticipated and dealt with before they occur.
- 2. Collaboration between departments and functions is good.
- 3. There is no goal conflict between safety and production.
- 4. Almost all mistakes are viewed in terms of process variability with the emphasis placed on understanding what has happened, rather than finding someone to blame.

- 5. Learning from others, both inside and outside the organization, is valued.
- 6. People are respected and valued for their contribution.
- 7. The relationship between management and employees is mutually supportive.
- 8. People are aware of the impact of cultural issues, and these are considered in decision making.
- 9. People are rewarded for improving processes, as well as results.
- 10. People are considered to be an important part of organizational systems with attention given to satisfying their needs, and not just to achieve technical efficiency.

Way of life

This stage includes all the proactive stage features with active participation at all levels. Management's role is seen as coaching people to improve performance, rather than involving directly in safety issues. OHS is perceived to be an inherent part of the culture and the business. Organizations are characterized by chronic unease as a counter to complacency.

3.3 The Productivity Maturity Model

Based on the extant literature, a productivity assessment tool must address two perspectives or dimensions, each of which encompasses a number of variables. Specifically, the literature proposes that an assessment tool must include the following:

(1) A technical perspective, which reflects performance, methods, and tools in relationship to the given company's strategic "scope", as described by (Hines et al., 2004).

(2) An organizational perspective, which reflects management, organizational and human capabilities, culture, and learning.

Based on the literature review we identified maturity models related to continuous improvement/productivity (Bessant et al., 2001) and lean (Jorgensen et al., 2007). However, the continuous improvement/productivity models identified in the literature were more complete and covered more aspects of production and operations than the lean maturity models. Based on this, we combined both models to create our own which have features of both the continuous improvement/productivity and lean models. The maturity model of this study (Figure 2) is based on a 1-to-5 rating scale in order to assess the Productivity Maturity level, where stage 1 represents the lowest level of maturity and stage 5 is best in class.



Figure 2: The Productivity Maturity Model

Stage 1: Reactive

This level is characterized by occasional rather random efforts at optimization in various organizational units, but these activities are not planned or implemented on the basis of an overall strategy or a specific manufacturing philosophy. The optimization projects are typically led by experts with little to no general employee involvement. Organizational mechanisms and systems are not integrated with the improvement philosophy and/or objectives. Some characteristics of this level are:

- 1. Problem-solving random and ad hoc oriented
- 2. No formal efforts or structure
- 3. Occasional bursts punctuated by inactivity and non-participation
- 4. Dominant mode of problem-solving is by specialists
- 5. Short-term benefits
- 6. No strategic impact

Stage 2: Formal

The company has now chosen the improvement strategy that will serve as the basis for production optimization. Experts are leading the initiative and some workers have received basic training. Pilot projects have been initiated in isolated units within the organization for the purpose of experimenting with improvement tools and methods. At this stage, initiatives happen as a result of learning curve effects associated with a particular process improvement projects and then fade out again. Improvement initiatives can also result from a short-term input - a training intervention, for example, - and leads to a small impact around those immediately concerned with it. These effects are often short-lived and much localized. Some characteristics of this level are:

- 1. Increased training of the workforce on improvement tools
- 2. Most projects done by experts with some participation of the workforce
- 3. Structure and strategy of the improvement are in place before the full deployment phase

Stage 3: Deployed

The implementation of the improvement initiative is now a part of the organization's strategy and projects and activities are planned on the basis of established goals and objectives. Knowledge of and practical experience with tools and methods as well as the manufacturing improvement are acknowl-edged and recognized at all levels of the organization, although initiatives are still primarily implemented according to an established plan. Satisfactory performance improvements are achieved. Specific HR systems (i.e. selection, compensation, training functions) are aligned with lean objectives to support improvement goals.

Some characteristics of this level are:

- 1. Formal attempts to create and sustain the improvement outcomes and practices
- 2. Use of a formal problem-solving process
- 3. Formal attempts to increase employees' participation
- 4. Training in basic Productivity/lean tools
- 5. Structured idea management system
- 6. Recognition system
- 7. Can extend to cross-functional work but on an ad hoc basis

Stage 4: Autonomous

Productivity/Lean activities occur continuously from all areas of the organization. The practical understanding of improvement tools and methods is quite high and these are used actively by all members of the organization to develop and implement performance improvements. All HR functions are aligned with improvement objectives for the purpose of supporting long term sustainability. Focus on, e.g. career development and extended developmental activities (e.g. external education). Management is still directly involved in sustaining lean in the organization. Some characteristics of lean at this stage:

- 1. All of the previous stage
- 2. Formal deployment of strategic goals
- 3. Monitoring and measurement of Productivity against these goals

Stage 5: Way of life

The improvement strategy is no longer just an internal strategy and its impact is visible in activities throughout the extended value chain level. Improvement activities are planned, implemented, and monitored across the extended boundaries. Knowledge sharing and knowledge transfer are important components of the activities across the extended boundaries and organizational structures support inter-organizational network building. The involvement of top management in sustaining Productiv-ity/lean is much reduced. Some characteristics of Productivity/lean at this stage:

- 1. All of the previous stage
- 2. Responsibility for mechanisms, timing, etc., devolved to problem-solving unit
- 3. High levels of experimentation
- 4. Automatic capture and sharing of learning
- 5. Everyone actively involved in innovation process

3.4 Selection of companies

50 companies will be selected. The point of departure is advanced, medium and less advanced in terms of production capacity level and OHS level. Size is used as a proxy for the level. The companies

will be stratified on three size groups according to number of employees and number of production sites:

- Big companies with multiple production sites (above 2000 employees)
- Medium companies with one or a few sites (from 500 to 2000 employees)
- Small companies with one site (below 500 employees)

Candidates are contacted by telephone in order of priority and asked to join and the first introductory meeting is organised. Blind contact is avoided as it is not effective in Bangladesh. As consequence, persons from the companies, who are already known to the research team through personal or professional contacts, are the main contacts.

3.5 Expert testing

The questionnaire of the baseline study has been reviewed by experts from Bangladesh and from Denmark. The experts from Bangladesh have focused on the operational applicability of the questionnaire and adjust according the Bangladeshi context. These are operations managers or professionals from international or local work associations related to the RMG industry in Bangladesh. The experts from Denmark have focused on the research method (assessment model, scoring, type of questions, validity and reliability issues). The methodology has been adjusted according to experts' comments.

3.6 Pilot testing

Two companies from the RMG industry in Bangladesh have been used for the pilot testing of the questionnaire. The two companies have different sizes: one is big and the other is small/medium. The pilot testing was used to test the applicability of interview guides, observations forms and quantitative data sheets as well as the relevance of the items and scales. Pilot testing was carried out in August 2015. The two companies were promised to be anonymous.

3.7 Training of researchers

A training workshop was organized at AUST in August 2015 for the training of the researchers involved in the baseline study (Professors from AAU and AUST, PhD students, Research assistants). The workshop included presentation of background for methodology, maturity models and data sampling methods. Data sampling, analysis and scoring were furthermore trained during pilot visits to two companies.

4 Data collection in companies

Data collection involves two to three visits to each company. The number of visits has to be kept down due to logistic and resources constraints.

4.1 Introductory visit

Purpose of the introductory visit(s) is to:

- secure the necessary social ties and consent from the company managers
- plan the subsequent data collection
- collect the first basic information about the company
- get an overview of the production set up

Participants from AUST: One senior researcher, one PhD student and one research assistant. It is expected to use half day in the company. The project has allocated funds to entertain the managers with a joint lunch.

The meeting should include:

- presentation of researchers
- presentation of project
- expectation towards the company
- the offer to give researcher feedback to company
- a promise of confidentiality
- collection of basic information
- a short tour round the company
- planning data collection

Before planning it is proposed to the manager to make a short round tour in the factory in order to get an overview of the production set up in the company. The planning of the data collection includes:

- agreement on date for next visit
- a list of interview persons
- a sequence for the data collection day
- a list of quantitative data to make available

• agreement about the selected part of the production process to carry out observations

The opportunity is used to collect general information about the company.

4.2 Main data collection

The main data collection is planned to take place as soon as possible after the introductory visits. It is expected to last for one full day, and the AUST participants are one senior researcher or one PhD student and one research assistant. The purpose is to collect the main bulk of information from the company. The data collection will cover the four types of evidence in Table 2.

Table 2: The four types of evidence

	Evidence
Data	
Documenta-	
tion	
Informants	
Observation	

1. Data cover the numerical measurements and indicators of productivity and OHS.

- 2. Documentation covers quantitative number on production and OHS, minutes of meetings, written policies and norms, projects and programmes description and procedures etc...
- 3. Informants This category represents all information obtained from the semi-structured interviews and focus groups with employees and managers. People that can be interviewed include Production managers, Safety managers, HR managers, Sales managers, Production Supervisors, workers (participation committee member and/or union representatives). The interviews with the various informants will be partly overlapping. If information is collected from one informant, then it can be checked from another informant as part of triangulation. If information is simple and no reason to doubt, repetition of questions can be skipped.
- 4. Observation This is the visual evidence observed by researcher during the observation tour, such as the design of the process flow in the shop-floor, visual cards with different colours indicating the safety levels, level of risk control, kanban, etc...

All four types of evidence are not available for all dimensions. Rather some dimensions might rely heavily on data, while others could depend on interviews and observations. As such, the researcher will have a list of the types of evidence needed for each dimension and use this list as guide for collecting evidence during the full day visit. The day is completed by a winding up meeting with management which includes feedback to management and making agreement about acquisition of missing information (especially quantitative data).

4.3 Follow up visit

Purpose is to collect missing information and give feedback to management. As far as possible a follow up visit is avoided to save resources but only in case that all necessary data

Participants: Senior researcher + PhD student + research assistant

5 Data analysis and report writing

5.1 Writing detailed summaries of all interviews and observations

To be carried out by research assistant in consultation with PhD student. The template for interview summaries is used. Summaries are as detailed as possible and include both questions and answers. No assessment, only data as spoken by interview persons.

5.2 Data entry of all quantitative data in spread sheet

All quantitative data including basic information and score sheets from observations is keyed in to a spread sheet. To be carried out by research assistant in consultation with PhD student

5.3 Scoring of all scales and maturity level

The stage of development of productivity and OHS maturity in an organization is assessed using the following method. Each of the dimensions is viewed in a different way in each of the five stages of development of maturity. The approach is to consider which stage is most reflective of the factor being considered. When this is done for all the dimensions, it will generally be found that one specific stage has been selected more than the others. The stage with the majority of selections is considered to be the stage to which the organization, under consideration, has developed its safety maturity.

5.3.1 Aggregate assessment example

For each of the dimensions, select the stage that most reflects the organization. The aggregate assessment of the company is the average of the individual scores of all dimensions. As such, each company will have 2 aggregate scores: one score for OHS and one for Productivity.

5.4 Writing a narrative report

Approximately 10 pages + appendices with interview summaries, basic information forms, quantitative data, and observation form and scales (Phd-student and Research assistants).

5.5 Validity, Reliability and Quality Control

The validity and reliability of the research are secured through the determination of guidelines for the conduction of the empirical analysis and its outcomes. The guidelines are:

- 1. Two researchers participate in each visit.
- 2. All researchers have been trained in the methodology and scoring and observations aligned.
- 3. The researchers archive all the original data
- 4. The analysis of data (interpretation and conclusions) is done by at least two researchers
- 5. In case of disagreements between the two researchers, a third senior researcher makes a third assessment for solving the disagreement
- 6. A senior is making quality control assisted by a checklist securing that all data is collected, interviews and data keyed in and report has the expected quality level.

Appendices

Appendix 1: Basic company information

The basic information of the companies is presented in the following tables.

Date	
Responsible researcher	
Other researchers	

Company information (if possible fill out before visit)

Name of company	
Ownership	
EPZ/Ownership	
Headquarter address	
Webpage	
Foundation	
Number of production sites	
% export	
Production capacity (Maxi-	
mum number of units pro-	
duced in one shift under nor-	
mal conditions of machines	
and workers)	

Production site

Name	
Address	
General manager (name, email, tel)	

Departments/structure	How many departments/units and the name of each depart- ment/unit
Description of facilities	
(buildings, area, stories)	
Production capacity (Maxi-	
mum number of units pro-	
duced in one shift under nor-	
mal conditions of machines	
and workers))	
Main costumers	
% utilization of capacity	
Certificates	
Membership of business as-	
sociations	
Unions/committees	

Main products of the site (no of pieces)	Last Year	Current year + pro- jection
Comments		

Employees of the site	Last year	Current year + pro-
		jection
Total (incl. all categories)		
- male		
- female		
Shop floor workers (produc-		
tion)		
Managers and production staff		
HR and safety staff		
Quality assurance staff		
Comments		

Accidents	Last year	Current year + pro- jection
Total no. of accidents		
Comments		

Turnover and absenteeism	Last year	Current year + pro-
		jection
Turnover in % (annually)		
Absenteeism in % (annually		
including with and without		
leave)		
Comments		

Productivity	Last year	Current year + pro- jection
Standard main product		
Units/minutes (SMV)		
Units/worker/hour		
Comments	Standard product is the	ne basic product
	(Basic shirt, Basic T-	shirt and Basic
	pants). SMV is Stand	ard Minute Value.

Quality	Last year	Current year + pro-
		jection
Employees		
% of products with quality de-		
fects		
% of Remaking (Total defects		
less Rejected)		
% no of products scrapped or		
rejected by quality control		
Acceptance quality limit		
(AQL)		
Comments		

Salaries and working hours for shop floor workers		
Lowest salary		
highest salary		
Average salary		
Normal working hours daily		
Average number of overtime hours		
daily		
Number of shifts		

Appendix 2: Interview guides and templates

For each dimension under assessment, there are four types of evidence. The following two sheets contain a summary of all dimensions (for both OHS and lean/productivity) and the types of evidence needed to fully assess each dimension. Based on these two sheets, the researcher can plan his working day by identifying the type of information and the instruments needed in order to access the dimensions.

	Evidence			
Dimension	Data	Documentation	Informants	Observation
		The OHS Mat	urity Assessment	
Leadership commitment and communication	Х	Х	Х	Х
Business Policy	Х	Х	Х	
Relation with contractors	Х	Х		
Relation with buyers	Х	Х	Х	
Objectives, Targets & Per- formance Measurement	Х	Х	Х	Х
Training	Х	Х	Х	Х
Workforce Involvement	Х		Х	Х
OHS structure and accounta- bility for OHS results	Х	Х	Х	
Accident Investigation	Х	Х	Х	
Unsafe Behaviors and Un- safe Work Conditions	Х	Х	Х	
Legal requirements, Audit- ing and Reviews	Х	Х	Х	
Industrial relations, Welfare and Job Satisfaction	Х	Х	X	Х

		Evi	dence	
Dimension	Data	Documentation	Informants	Observation
		The Productivity N	Maturity Assessme	nt
Leadership commitment	Х		Х	
Employee involvement	Х	Х	Х	
Training	Х	Х	Х	
Continuous improvement	Х	Х	Х	Х
Value stream mapping	Х	Х	Х	Х
Control through Visibil-	v	v	v	v
ity	Λ	Λ	Λ	Λ
Accounting support to	x		x	
Productivity	71		71	
5S/housekeeping	Х		Х	Х
Preventive maintenance	Х	Х		Х
Structured Flow/Pull	v		v	v
Manufacturing	Λ		Λ	Λ
Customers and Suppliers	v	V	v	
relationships	Λ	Λ	Λ	

Detailed notes are taken from all interviews. The research assistant either key in directly on the laptop or take handwritten notes which are keyed in immediately after the visit is completed. It is recommended that the researcher start the interview with open ended questions about the area or the dimension investigated. Then the researcher is encouraged to ask more focused close-ended questions in order to investigate deeper on one or more aspects of the answer of the interviewee.

Appendix 2.1 Interview checklists

The following tables contain the list of items that should be covered by the researcher during the interview according to the function and responsibilities of the interviewee.

Interview HR manager / Compliance manager / Safety manager				
	Evidence			
Dimension	Data	Documentation	Informants	Observation
		The OHS Maturity	Assessment	
Leadership com- mitment and com- munication	The number of OHS pro- grammes / Initiatives initi- ated and championed by top management / Number of health and safety pro- jects initiated by employee suggestions	Descriptions of OHS im- provement programmes (team composition, ac- tions, outcomes) / Policy about dealing with em- ployees involved in acci- dent / Meeting minutes / memos of health and safety meetings where employees suggestions for health and safety im- provement are noted and acted upon	What do you do af- ter an accident? What happens to the employees in- volved in severe accident? What kind of safety com- munication do you use? Normally and after an accident?	
Business Policy	Type and number of awards / List of receivers of safety awards	Policy, Memo or minutes of meetings out- lining the decision pro- cess and actions related to safety investments / Safety Award pro- gramme description (who is awarded? What is the criteria for awards?)	What types of in- vestment in OHS has been done? What kind or recognition or re- wards for safety do you have?	
Relation with con- tractors	The number of pre-quali- fied contractors / Total of contractors / Total of audits / Audits per contractor	Prequalification ques- tionnaire for contractors / Training for contrac- tors / Auditing process and resources/audits car- ried out and conse- quences taken	Do you have con- tractors? What kind of prequalification OHS criteria you look at?	
Relation with buy- ers	The number of direct and indirect buyers / Duration of relationship / Percentage of total revenues or sales per buyer / Total of audits / Audits per buyer	Prequalification ques- tionnaire of buyers / Training by buyers / Au- diting process (auditing items, penalties, correc- tive actions, resources)	Can you describe the relation with your main buyers?	

Objectives, Tar- gets & Perfor- mance Measure- ment	Number of safety indica- tors (proactive and reactive / outcomes and process in- dicators) / Trends and charts of safety indicators	List of safety indicators and objectives / Owners of indicators / Process of monitoring and review	Do you have safety targets? What safety indicators and target do you have? Who is in- volved in establish- ing and improving safety targets?	Look for visual safety indicators in the workplace
Training	Number of trained employ- ees and managers	Documentation for train- ing (new employees, managers, safety profes- sionals, office workers, shop floor workers)	What are the safety trainings you have? What is the aim of these training mod- ules? How you identify needs for training?	Look at the quality and availability of health and safety training facilities and equipments
Workforce In- volvement	Number of employees from each department engaged in safety initiatives (safety department, production, managers and workers)	Committees with worker participation (actions and outcomes) / De- scription of OHS work planning and the review process / Participants in the planning and review / Policy for risk analysis (participants / impacts on operations/ imple- mented risks assess- ments / List of items checked and description of the process of daily checks / participants / impacts on operations)	What the safety on- going initiatives? Do you have OHS planning? Do you have safety com- mittees? Do you have daily checks? How is it done?	Look at the software or other techniques used for risk analysis
OHS structure and accountability for OHS results	Number and seniority of people in the safety depart- ment / Turnover of OHS employees	Description of OHS re- sponsibility in the com- pany / Policy or minutes describing the accounta- bility of managers and workers for OHS results and control.	What is the struc- ture of safety? Who is responsible for following up on ac- cident issues?	
Accident Investi- gation	Number of accidents inves- tigated / Outcomes / Im- pacts	Description of the pro- cess for investigation of accidents (responsible for investigation and maintenance)	Do you have inves- tigation process? Can you describe the process? Out- comes and follow up?	Look at the imple- mentation and out- comes
Unsafe Behaviors and Unsafe Work Conditions	Number and types of un- safe behaviors and unsafe work conditions / Severity	Description of the pro- cess of reporting and im- provement	What are the unsafe behaviors and un- safe work condi- tions? How do you report unsafe be- havior and unsafe working condi- tions?	
Legal require- ments, Auditing and Reviews	Number of critical and ur- gent issues in audit	Description of audit sys- tem / Latest regulatory assessment / Action plan	Please describe the auditing process and types	
Industrial rela- tions, Welfare and Job Satisfaction	Number of employees us- ing companies benefits / Type of benefits used	Description of the bene- fits policy	What are the bene- fits you have? How is the satisfaction with the benefits?	Look at the quality of the services (Medical Centre, Canteen, Childcare, Dormito- ries)

Interview Production manager				
		Ev	idence	
Dimension	Data	Documentation	Informants	Observation
Leadership commit- ment	Number of full time lean employees or equivalent / Seniority level / Years of lean experience / Number of managers experts in	Projects and im- provement docu- mentation	Maturity Assessme What are the lean/improvement initiatives? Who participate in the projects? Who is the driver of the pro-	ent
Employee involve- ment	lean/improvement Number of improve- ment suggestions (To- tal / implemented/out- comes) / Number of employees participat- ing in group projects	Description of the employees sugges- tions program / Doc- umentation of group projects/teamwork and participants	jects? Do you have an im- provement process? Who is involved in improvement?	
Training	Number of trained em- ployees (shop floor / staff / Managers) / Number of hours train- ing by employee	Description of type of training available (basic, specialists, technical, behav- ioral)	What types of im- provement training do you have? How do you identify the need for improve- ment training?	
Continuous im- provement	Data showing number and type of errors / trends in errors / num- ber of SOP	Description of prob- lem solving methods based on use of data and performance in- dicators	Explain how you measure errors/de- fects and improve the process. Do you have SOP? How is SOP used? Who is involved in continu- ous improvement?	Look for SOP at the pro- duction line / Look for er- ror proofing devices in the production line. Look for implemented improve- ments
Value stream map- ping	Number of mapped value steam processes / outcomes	Maps and descrip- tion of value stream processes	Do you use value stream mapping? How do you use VSM?	Look for the maps of value stream processes
Control through Vis- ibility	Number of techniques/ Number of units using visual management techniques	Description of the objectives and im- plementation of vis- ual management tools	Do you use visual management? What tools of visual man- agement? How do you use the tools? What are the bene- fits?	Look for visual instru- ments in the shop floor and offices
Accounting support to Productivity	Accounting data sup- porting lean/improve- ment activities		Do you use ac- counting infor- mation for improve- ment?	
5S/housekeeping	Number of areas with 5S implemented and status of implementa- tion	Description of 5S project	Do you use 5S? What are the status and the challenges of 5S?	Look at the 5S status on the shop floor and staff of- fices
Preventive mainte- nance	Number of employees trained in preventive management/data used for preventive mainte- nance	Preventive mainte- nance policy	Do you have pre- ventive mainte- nance? How it works? Who does the preventive maintenance?	Look at the preventive maintenance schedules and devices at the shop floor
Structured Flow/Pull Manufacturing	Data about Takt time (= Production time available / Customer volume) / inventory level		Do you use flow or takt-time concepts? Do you use U shape or other shapes?	Look at the production line for inventories/Kan- ban/flow/U- shape/Cells/Pull

Customers and Sup- pliers relationships	Performance Indicators with suppliers and cus- tomers	Х	What type of coop- eration for produc- tion improvement do you have with your suppliers/cus- tomers? Are there sharing of experi- ences and risks?	
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Quality manager			
	Interview topics		
Structure and organization of quality control	Number of quality managers and supervisors, technical and admin in- volved		
Quality management and con- trol	Control items (size of the product, quality of the work)/ quality manage- ment by looking at wastes, reworks, rejections. (Measures like 3 sigma or 6 sigma; hypothesis testing such as t test or Chi square etc; What is the process in case of rejections or defects? / Quality tools and tech- niques (form groups for investigation, look at numbers and statistics, use fishbone or PDCA)/ Error proof devices (if error above the accepta- ble limit, does the device shut the machine?)		
Quality KPIs (Benchmark)	% of defects, time used for rework, value of scrapped products		
Training in quality	Types of training (technical training like measurements or machine ad- justments, tools like root cause analysis, use of numbers and statistics, understanding of variations and trends) / Number and level of trained employees (new employees, experienced quality controllers or inspec- tors, training for quality supervisors and managers)/ policy of training (automatic or according to needs)		
Quality certifications	ISO 9001, others / what is the meaning of these certifications for the company? Is this for the buyers? Or workers involvement and motivations? Have these certifications impacted quality and productivity?		
Suppliers	Quality control of supplies (what happens if the quality of supplies is not good?), indicators (on time delivery, quality of supplies, price of supplies versus quality), new products from suppliers		
Buyers	management of customer demands (sampling, PP(pre-production), pro- duction; time and quality for the acceptance process), indicators (time and quality), customer audits, new techniques (sometimes buyers sup- port or provide the technology)		
Challenges and expectations	quality challenges (new customers or new styles), expectations and plans for future development of quality control and management / fu- ture certifications		

Employees (focus group)		
	Interview topics	
Experience with production and quality	Examples of production constraints and quality problems. Ideas for improvement	
Experience with OHS and HR	Examples of OHS problems and HR problems (salaries, hours, benefits etc.). Ideas for improvement	
Involvement in improvement of production and OHS	Examples of involvement, participation, process and outcomes, collabo- ration with supervisors	
Training	Production, quality and OHS	
Accidents	Examples of accidents, Investigation, follow up prevention and impact on workers	
OHS policy practice	OHS checks / risk assessment / Reporting accidents / unsafe conditions / rewards	
Benefits and services	Use / satisfaction	

General manager of site			
	Interview topics		
History	Main historical information about site and company		
Growth (Investments / hiring)	Future or planned investments and hiring		
Challenges	External and internal challenges		
Strategic advantages	Competition / capabilities / Technology		
Buyers	Relation and impact on business, collaboration (long term relationship, trust, commitment or shopping around)		
Compliance	Compliance/OHS versus Productivity		
Productivity or Lean	Tools and philosophy for increasing productivity		
Employee satisfaction and turn- over	Scores and actions		

Appendix 2.2 Interview sheet

(To be copied, one for each interview)

The following sheet is the standard instrument used for writing the conversation during the interviews.

Date and duration of inter-	
view	
Responsible research	

Other participating resear-	
chers	
Interview person(s) (posi-	
tion, main tasks, name, edu-	
cation, seniority)	
Summary of interview	

(to be continued on as many pages as necessary)

Appendix 3: Observation guide

The following observation form should be filled during the tour in the shop floor and the premises of the company. Before filling the score, please be sure that you have the exact understanding of the object being scored. Check with senior researcher and with shop floor manager in case of doubt. In the comment field, it is expected that the researcher give relevant details about the object being scored which help understand the level of scoring.

Observation form

(Selected production line/department)

Name of line/department	
Date of observation	
Participating site staff (posi-	
tion, main tasks, name, edu-	
cation, seniority)	
No of workers	
No of supervisors	
Production equipment	Number of workstations and machines
Main products	
Output/hour or day (Takt	
time)	

Scoring 1-5, NA (1=conditions poor/risks not controlled/low productivity/not existing, 3=conditions acceptable, risks controlled/productivity as expected, present at expected level, 5=conditions good, risks avoided at high level, productivity high, present at best level, NA=not applicable)

Item	Score	Comment
Machine risks (physical		
protection and behaviour)		
Chemical risks		
Vapours and dust		
Noise		
Housekeeping		
Lighting		
Layout (easy access, unnec-		
essary movements and		
transport avoided)		
Heat		

Ventilation	
Floor marking of transport	
and production areas	
Smooth floor without holes	
Chairs with backrest and	
height adjustable	
Tables/machines in good	
height and adjustable	

Materials and tools within	
easy reach	
Equipment for heavy lifting	
and carrying (lifts, carts	
etc)	
Standard of machinery and	
equipment (age, mainte-	
nance)	
Standard of machinery and	
El (i l l l c	
Flow (line balancing, bull-	
Verber	
Kanban	
SOP	
Daily/weekly production	
performance displayed	
Quality defects displayed	
Accidents and incidents	
displayed with actions	
Kaizen boards	
OHS labels and posters	
Access to drinking water	
Toilets	

Possibilities for improvement of OHS and productivity (at least five possibilities)

Description of improvement	OHS, productiv- ity or both	Requirements for implementation (cost, complexity, knowledge)

Appendix 4: OHS Maturity Level Assessment

Organizations vary in their understanding of the concept of OHS maturity, and the actions necessary to influence it in a positive way. Organizations may eventually evolve and develop this understanding. The five stages should not be considered as totally distinct. It is possible for an organization, at any one time, to exhibit characteristics associated with several, or all, of the stages. Based on the review of the safety literature, we have identified 12 organizational dimensions. The health and safety maturity level for each of these dimensions will define the aggregated OHS maturity level of the organization. The 12 dimensions are the following:

1. Leadership Commitment and Communication

- a) Individuals are not blamed for the accidents and other risks; rather the management believes that accidents and risks emerge through the interaction of systems and people.
- b) Management takes responsibility for identifying the root causes of accidents and risks and eliminating them
- c) Management is directly involved after an accident or worker experience of another OHS problem and show personal interest in the affected individuals and the investigation process.
- d) Employees from all departments take accidents and exposure to others personally and seek ways for avoiding similar accidents in the future.
- e) There is an open two-way channel of communication between employees and management.
- f) The organization checks regularly the effectiveness of the communication with employees.
- g) The company communicates to the employees all safety related issues regardless of severity or impact on production.

	Evidence	Responsible
Data	The number of OHS programmes / Initiatives initiated and championed by top management / Number of health and safety projects initiated by employee suggestions	HR manager
Documenta- tion	Descriptions of OHS improvement programmes (team composition, actions, outcomes) / Policy about dealing with employees involved in accident / Meeting minutes / memos of health and safety meetings where employees suggestions for health and safety improvement are noted and acted upon	HR manager
Informants	What do you do after an accident? What happens to the employees involved in severe accident? What kind of safety communication do you use? Nor- mally and after an accident?	HR Manager
Observation		

Reactive	Formal	Deployed	Autonomous	Way of life			
Leadership Commi	Leadership Commitment and Communication						
Responsibility for	The leadership sees	OHS compliance	Management look	The responsibility			
accidents is seen	OHS compliance as	practices and goals	at the whole system,	of OHS compliance			
as belonging to	one of the goals of	are communicated	including processes	is distributed			
those directly in-	the business. The	in the organization.	and procedures	among all employ-			
volved. The prior-	responsibility of the	There is increase in	when considering	ees and managers.			
ity is to limit the	system for acci-	awareness. How-	accident causes. In-	People take a broad			
damage and get	dents is considered	ever, there is con-	vestigation focuses	view looking at the			
back to produc-	but has no conse-	sistent leadership	on underlying	interaction of sys-			
tion.	quences.	follow up for im-	causes and the re-	tems and people.			
Management is not	The "flavor of the	plementation.	sults are fed back to	There is a definite			
interested apart	month" safety mes-		the supervisory	two-way process			
from telling work-	sage is passed down		level. It is admitted	where management			
ers not to cause	from management.		that management	gets more infor-			
problems.	Any interest dimin-		must take some of	mation back than			
	ishes over time as		the blame. Manag-	they provide.			
	things get "back to		ers realize that dia-				
	normal".		logue with the				
			workforce is desira-				
			ble and so a two-				
			way process is in				
			place.				

2. Business Policy

- a) Workers and managers value the recognition as they consider good safety performance intrinsically motivating
- b) Evaluation is based on outcomes and continuous improvement (process improvement).
- c) Management and employees recognize that productivity and safety objectives can come into conflict.
- d) Measures are in place to explore and identify synergies out of these conflicts (internally and with contractors/buyers) in an effective and transparent manner.

	Evidence	Responsible
Data		
Documenta- tion	Policy, Memo or minutes of meetings outlining the decision process and actions related to safety investments / Safety Award programme description (who is awarded? What is the criteria for awards?)	HR manager
Informants	What types of investment in OHS has been done? What kind or recognition or rewards for safety do you have?	HR manager
Observation		

Reactive	Formal	Deployed	Autonomous	Way of life
Business Policy				
Productivity is the	Cost is important	Company have	The company is	Management be-
only concern.	but OHS compli-	communicated poli-	learning how to jug-	lieves that safety
Safety is seen as	ance is gaining im-	cies and rules for	gle the two objec-	makes money. The
costing money, and	portance. However,	acceptable OHS	tives. The long term	company is quite
the only priority is	OHS effort and re-	compliance on both	aspects of OHS	good at juggling the
to avoid extra	sources have focus	operations and be-	compliance are pre-	two, and accepts de-
costs.	on operational fac-	havioral aspects.	sent in top manag-	lays to get contrac-
Staying alive is re-	tors (not behav-	However, the cost	ers' practices.	tors up to standard
ward enough.	ioral).	aspect is still domi-	Good performance is	in terms of safety
There are only pun-	The understanding	nant in relation to	considered in pro-	and to achieve ac-
ishments for fail-	that positive behav-	mid- and long term	motion reviews.	ceptable working
ure.	ior can be rewarded	OHS issues.	Evaluation is pro-	standards for work-
	has not yet arrived.		cess-based rather	ers.
			than on outcomes.	

3. Relation with contractors

- a) The company does not lower OHS requirements in contracting services
- b) The company postpones the job until satisfactory OHS conditions are met in the contracting partner.

	Responsible			
Data	Data The number of pre-qualified contractors / Total of contractors / Total of audits /			
	Audits per contractor			
Documenta-	Prequalification questionnaire for contractors / Training for contractors / Audit-	HR manager		
tion	ing process and resources/audits carried out and consequences taken			
Informants	Do you have contractors? What kind of prequalification OHS criteria you look	HR manager		
	at?	-		
Observation				

Reactive	Formal	Deployed	Autonomous	Way of life				
Relation with contractors								
Get the job done	Company has estab-	Contractors meet	Safety issues are	No compromises to				
with minimum ef-	lished some formal	pre-qualification re-	seen as partnership	work healthy and				
fort and expenses.	procedures and se-	quirements, based	opportunities. Pre-	safely. Find solu-				
The company only	lection criteria for	on questionnaires	qualification is on	tions together with				
pays attention to	subcontractors.	and statistics. How-	the basis of proof	contractors to im-				
safety issues in	However, still very	ever, Safety stand-	that there is a work-	prove the safety				
contracting compa-	poor safety perfor-	ards are lowered if	ing safety manage-	management system				
nies after an acci-	mance has conse-	no contractor meets	ment system in the	and to achieve ex-				
dent.	quences for choice	requirements.	contractor. Joint	pectations even if				
	of contractors.		company-contractor	this means postpon-				
			safety efforts are ob-	ing the job until re-				
			served and the com-	quirements are met.				
			pany helps contrac-					
			tor with compliance					
			and training.					

4. Relation with buyers

- a) The company has contractual obligations that cover safety and social responsibility activities.
- b) The company has long term relationship with its buyers based on partnership and regular auditing

-		
	Responsible	
Data	The number of direct and indirect buyers / Duration of relationship / Percentage of total	General manager and
	revenues or sales per buyer / Total of audits / Audits per buyer	HR manager
Documenta-	Prequalification questionnaire of buyers / Training by buyers / Auditing process (au-	General manager and
tion	diting items, penalties, corrective actions, resources)	HR manager
Informants	Can you describe the relation with your main buyers?	General manager and
		HR manager
Observation		

Reactive	Formal	Deployed	Autonomous	Way of life				
Relation with buyer	Relation with buyers							
Price is the only	There are some con-	There are contrac-	Pre-qualification is	The company has				
decisive factor for	tractual obligations	tual obligations and	on the basis of proof	long term relation-				
the relationship be-	to improve the basic	incentives to im-	that there is a work-	ship with most of its				
tween the company	work conditions and	prove OHS compli-	ing safety manage-	buyers based on a				
and its buyers.	labor compliance.	ance. The company	ment system in the	sustainable balance				
There are no con-	The company in-	meets buyers' pre-	company. Joint com-	between safety and				
tractual obligations	vests in improving	qualification re-	pany-buyer safety	productivity. The				
	the health and safety	quirements. Safety	efforts are observed	buyers audit				

to cover OHS com-	issues only if it risks	standards are im-	and the buyers help	smoothly and regu-
pliance.	attrition with its	proved in order to	the company with	larly the company
	buyers.	attract buyers. How-	training and compli-	and agree on safety
		ever the focus is still	ance on short and	improvement ac-
		on the short term	long term OHS ob-	tions.
		compliance.	jectives.	

5. Objectives, Targets & Performance Measurement

- a) Each site shall establish a measurable health and safety plan, quantifying corporate objectives and targets and site objectives and targets which shall be agreed by site personnel and corporate personnel.Objectives and targets shall be in line with the general target of enabling continual improvement of health and safety performance.
- b) Objectives and targets shall be communicated and understood by all appropriate personnel, including the Executive, Senior Management, line management, employees and contractors.
- c) Adequate resources shall be assigned to ensure that the planned and agreed targets and objectives are met.
- d) Senior management shall be issued with Health and Safety Performance Indicators. Safety performance shall be part of those indicators to ensure that safety is a priority for management.
- e) The company shall ensure that objectives and targets are reviewed on a periodic basis to ensure they stay on programme and to agree changes when they do not.
- f) Targets and objectives shall be both reactive—accidents, incidents and dangerous occurrences—and proactive—near hits, etc. and where appropriate, performance measures including benchmarking against established best practice.
- g) The organization and all sites will be responsible for the effective review of objectives, targets and performance indicators to ensure they remain relevant for the current safety risk.

	Evidence		
Data	Number of safety indicators (proactive and reactive / outcomes and process in-	HR manager / Production	
	dicators) / Trends and charts of safety indicators	manager	
Documenta-	List of safety indicators and objectives / Owners of indicators / Process of mon-	HR manager / Production	
tion	itoring and review	manager	
Informants	Do you have safety targets? What safety indicators and target do you have? Who	HR manager / Production	
	is involved in establishing and improving safety targets?	manager	
Observation	Look for visual safety indicators in the workplace	Line supervisor	

Reactive	Formal	Deployed	Autonomous	Way of life
Setting of Targets a	nd monitoring			·
Little evidence of	Safety goals are in-	Safety targets re-	Safety monitoring	Roles and activities
safety related activ-	troduced and based	lated to improving	and accountability is	are clearly defined
ities. There is some	around improving	standards or systems	spread to all depart-	for all levels in the
measurement effort	safety performance.	are communicated to	ments. Senior and	site (managers and
after accidents or		all departments, but	Operations Manag-	workers). Work
inspection. Formal	There is a site plan	actions for this	ers are involved in	teams independently
safety goals and ob-	established by the	mainly still apply to	determining safety	establish their own
jectives have not	safety department	the safety depart-	objectives in con-	work objectives.
been identified, let	that is passed around	ment.	junction with the	A performance mon-
alone documented.	the senior manage-	All targets are deter-	Safety department.	itoring system is in
	ment team, but not	mined by the Safety	The safety perfor-	place focusing on
	well communicated	department and	mance indicators are	operational excel-
	to the rest of the	sanctioned by Senior	proactive and reac-	lence and continuous
	workforce.	Management.	tive.	improvement.
		Monitoring is car-	Safety initiatives and	
		ried out by the	activities are ade-	
		Safety department	quately resourced	
		who also becomes	and action plans/ob-	
		accountable for ac-	jectives are set and	
		tions and activities	monitored by senior	
		related to the safety	managers.	
		management sys-		
		tem.		

6. Training

- a) Training needs are identified by management and workers
- b) The methods for acquiring skills are defined and agreed upon between management and workers
- c) Attitudes and behaviours towards health and safety are seen as important as acquiring skills and knowledge

	Evidence		
Data	Number of trained employees and managers	HR manager	
Documenta-	Documentation for training (new employees, managers, safety professionals, of-	HR manager	
tion	fice workers, shop floor workers)		
Informants	What are the safety trainings you have? What is the aim of these training mod-	HR manager	
	ules? How you identify needs for training?		
Observation	Look at the quality and availability of health and safety training facilities and	HR manager	
	equipments		

Reactive	Formal	Deployed	Autonomous	Way of life
Training				
No training takes	OHS Training needs	Competence matri-	Leadership fully	Issues like culture
place unless it is	are identified but are	ces are present and	acknowledges the	and attitudes be-
compulsory by law.	still more focused	lots of standard	importance of tested	come as important
After an accident	on technical skills	training courses are	skills on the job. The	as knowledge and
money is made	and do not approach	given. Acquired	workforce is proud	skills. Development
available for spe-	behavioral change.	course knowledge is	to demonstrate their	is seen as process ra-
cific training pro-	Employees are	tested. There is	skills in on-the-job	ther than an event.
grammes. The	trained to increase	some on-the-job	assessment. Culture	Needs are identified
training effort di-	knowledge about	transfer of training.	and attitudes are be-	and methods of ac-
minishes over time.	work risk and work	There is increasing	coming central is-	quiring skills are
	accidents.	awareness that	sues in training.	proposed by the
		safety culture and		workforce, who are
		attitudes are im-		an integral part of
		portant but there is		the process rather
		no focus on these		than just passive re-
		dimensions.		ceivers.

7. Workforce Involvement

- a) Employees from all departments and levels are engaged and interested in participating in safetyrelated issues.
- b) Employees have a good understanding of the safety issues and of the on-going safety initiatives.
- c) There is a running planning process integrating work, health and safety.
- d) The planning focuses on both the anticipation of problems and review of the process.
- e) Employees are trusted to do most planning.
- f) Job safety analysis / Job safety observation techniques are revised regularly and accepted by the workforce as being in their own interest.
- g) Workers and supervisors are not afraid to tell each other about hazards.
- h) Everyone checks for hazards and Supervisors encourage work teams to check safety for themselves.
- i) There is no problem with demanding shutdowns of operations.

Evidence				le
Data	Number of employees from each department engaged in safety initiatives (safety de-	HR	manager/	Safety
	partment, production, managers and workers)	manager		
Documenta-	Committees with worker participation (actions and outcomes) / Description of OHS	HR	manager/	Safety
tion	work planning and the review process / Participants in the planning and review / Policy	man	ager	
	for risk analysis (participants / impacts on operations/ implemented risks assessments			
	/ List of items checked and description of the process of daily checks / participants /			
	impacts on operations)			

Informants	What the safety on-going initiatives? Do you have OHS planning? Do you have safety	HR	manager/	Safety
	committees? Do you have daily checks? How is it done?	man	ager	
Observation	Look at the software or other techniques used for risk analysis	HR	manager/	Safety
		man	ager	

Reactive	Formal	Deployed	Autonomous	Way of life
Workforce Involver	nent			
The employees do	A group of selected	All Departments are	Employees from all	All employees are
not engage in	employees, mainly	involved in OHS	departments and all	engaged in both
safety issues.	related to safety de-	projects and OHS	levels are engaged	safety-related and
The employees are	partment, are en-	improvement. How-	and interested in	environmental is-
invited to partici-	gaged and interested	ever, the involve-	safety-related issues.	sues. The majority
pate in safety-re-	in safety-related is-	ment is still at the	OHS Planning is	of employees are in-
lated issues only	sues.	managerial level.	standard practice	terested in partici-
when serious acci-	Site activities are	No direct involve-	with work and OHS	pating in health and
dents occur based	regularly checked	ment of shop floor	integrated in the	safety-related issue.
on what went	by the line manage-	workers achieved.	plan. Plans are fol-	There is a polished
wrong in the past.	ment, but not on a		lowed through and	OHS planning pro-
	daily basis. Inspec-		there is some evalua-	cess with both antic-
	tions aim at compli-		tion of effectiveness	ipation of problems
	ance with proce-		by supervisors and	and review of the
	dures.		line management.	process. Employees
			Job safety analysis /	are trusted to do
			Job safety observa-	most planning.
			tion techniques are	There is less paper,
			accepted by the	and the process is
			workforce as being	well known and dis-
			in their own interest	seminated.
			and they regard such	Job safety analysis
			methods as standard	is revised regularly
			practice.	in a defined process.
			Supervisors encour-	People (both work-
			age work teams to	ers and supervisors)
			check safety for	are not afraid to tell
			themselves. Manag-	each other about
			ers doing walk-	hazards.
			rounds engage em-	Everyone checks for
			ployees in dialogue	hazards, looking out
			about the importance	for themselves and
			of regular daily	their work-mates.
			checks.	Supervisor inspec-
				tions are largely un-
				necessary. There is

		no problem with de-
		manding shut-downs
		of operations.

8. OHS structure and accountability for OHS results

- a) Safety is seen as an important job, given to high fliers
- b) Safety responsibilities and accountability are distributed throughout the company
- c) Measurement against the plan shall form part of the site and corporate safety accountability process.

	Evidence		
Data	Number and seniority of people in the safety department / Turnover of OHS	HR manager / Safety manager	
	employees		
Documenta-	Description of OHS responsibility in the company / Policy or minutes describ-	HR manager / Safety manager	
tion	ing the accountability of managers and workers for OHS results and control.		
Informants	What is the structure of safety? Who is responsible for following up on accident	HR manager / Safety manager	
	issues?		
Observation			

Reactive	Formal	Deployed	Autonomous	Way of life	
OHS structure and accountability for OHS results					
If there is a OHS	There is structure of	OHS structure be-	Safety is seen as an	There might not be a	
department, it con-	OHS department	comes a department	important job, given	Safety department	
sists of one person	based on the com-	with some status	to high fliers. Safety	because it is not	
or a small staff in	pany strategy and	and power, mainly	professionals are re-	needed, as the safety	
the HR department.	priorities for im-	performing number	cruited directly and	culture is right.	
There is no ac-	proving OHS stand-	crunching and send-	advisors are appreci-	Safety responsibili-	
countability as	ards. However, The	ing people on train-	ated by the line. All	ties are distributed	
nothing has been	OHS department is	ing courses.	senior people in op-	throughout the com-	
set. The department	held accountable	Accountability is	erations must have	pany. If there is a	
is seen as a police	alone for results.	split between safety	Safety experience.	department it is	
force.		department and line	Line managers and	small but powerful,	
		management de-	Supervisors are held	having equal status	
		pending on the re-	accountable for re-	with other depart-	
		sults.	sults as they are able	ments.	
			to detect and act pro-	Every worker in the	
			actively on health	organization is ac-	
			and safety issues.		

		countable for spe-
		cific risk control ac-
		tivities.

9. Accident Investigation

- a) There is a formal process for reporting and investigating accidents
- b) There are trained investigators to achieve a deep understanding of how and why the accidents happen
- c) There is follow up procedure to check that change occurs and is maintained.

	Evidence	Responsible
Data	Number of accidents investigated / Outcomes / Im-	HR manager / Production manager
	pacts	
Documenta-	Description of the process for investigation of acci-	HR manager / Production manager
tion	dents (responsible for investigation and maintenance)	
Informants	Do you have investigation process? Can you describe	HR manager / Production manager
	the process? Outcomes and follow up?	
Observation	Look at the implementation and outcomes	HR manager / Production manager

Reactive	Formal	Deployed	Autonomous	Way of life		
Accident investigation						
Many incidents are	There is a formal in-	There is a system-	There are trained in-	Investigation and		
not reported. Inves-	vestigation process	atic deployment of	vestigators to check	analysis by a deep		
tigation only takes	but it is not consist-	investigation pro-	that change has oc-	understanding of		
place after a seri-	ently followed.	cess based on re-	curred and been	how accidents hap-		
ous accident. Anal-	There reporting sys-	ports of accidents.	maintained. The	pen. The investiga-		
yses don't consider	tem and investiga-	However, the search	search involves all	tion process is well		
human factors or	tion often focuses at	for causes is usually	companies' aspects	assimilated at all		
go beyond legal re-	the immediate	restricted to the	and levels. Reports	levels of the com-		
quirements. Protect	causes. There is lit-	level of the local	are sent company-	pany. Real issues		
the company and	tle systematic follow	workforce.	wide to share infor-	identified by aggre-		
its profits.	up and previous		mation and lessons	gating information		
	similar events are		learned.	from a wide range of		
	not considered.			incidents. Follow-up		
				is systematic, to		
				check that change		
				occurs and is main-		
				tained.		

10. Unsafe Behaviors and Unsafe Work Conditions

Expectations:

- a) Unsafe behaviors and unsafe and unhealthy work conditions are avoided and sufficiently controlled at shop-floor level
- b) Unsafe behaviors and unsafe work conditions are timely and clearly reported
- c) The reports are made available for all employees and are used in daily work to improve the safety

	Evidence	Responsible
Data	Number and types of unsafe behaviors and unsafe work conditions / Severity	HR manager
Documenta- tion	Description of the process of reporting and improvement	HR manager
Informants	What are the unsafe behaviors and unsafe work conditions? How do you report unsafe behavior and unsafe working conditions?	HR manager
Observation		

Reactive	Formal	Deployed	Autonomous	Way of life			
Unsafe Behaviors an	Unsafe Behaviors and Unsafe Work Conditions						
There is no process	There is a formal	There process to re-	All employees are	All levels report and			
in place for report-	process to report and	port and act on un-	trained to report on	act on unsafe behav-			
ing or acting on un-	act on unsafe behav-	safe behaviors and	unsafe behaviors and	iors and unsafe			
safe behaviors and	iors and unsafe work	unsafe work condi-	unsafe work condi-	working conditions.			
unsafe work condi-	conditions, but it is	tions is known in	tions. Top manage-	Reporting process			
tions.	often ignored. If Re-	the company. How-	ment act and follow	and use is continu-			
	porting exists, it of-	ever, it is mainly	up on the report.	ously improved.			
	ten does not lead to	used by safety de-					
	action.	partment.					

11.Legal requirements, Auditing and Reviews

- a) Company have a full audit system running smoothly with follow up and improvement actions
- b) Company interacts smoothly with the regulatory bodies and employs a full disclosure policy

Evidence		Responsible
Data	Number of critical and urgent issues in audit	HR manager
Documenta-	Description of audit system / Latest regulatory as-	HR manager
tion	sessment / Action plan	
Informants	Please describe the auditing process and types	HR manager
Observation		

Reactive	Formal	Deployed	Autonomous	Way of life		
Legal requirements / Auditing and reviews						
Accept being au-	There is a regular,	There is regular au-	Extensive audit pro-	Full audit system		
dited as inescapa-	scheduled audit pro-	dit program cover-	gram including	running smoothly		
ble, especially after	gram. It concen-	ing all aspects of	cross-auditing within	with good follow up.		
serious or fatal ac-	trates on known	OHS compliance.	the organization. Re-	Continuous informal		
cidents. No sched-	high hazard areas.	However, the results	sults achieved in all	search for non-obvi-		
ule for audits and	The auditing process	are more visible for	areas of compliance.	ous problems with		
reviews, as they are	is not able to iden-	some areas (like		outside help when		
seen as punish-	tify the ceremonial	heat and ventilation)		needed. There are		
ment	practices and to	and less visible for		fewer audits of hard-		
	make them more	areas such as		ware and systems,		
	substantive.	worker health, ergo-		and more at the level		
		nomics, and psycho-		of behaviors.		
		logical stress.				

12. Industrial relations, Welfare and Job Satisfaction

- a) Company and employees communicates regularly about ways to increase Job satisfaction
- b) Instruments such as collective bargaining (collective committee), social and financial support and benefits are all available

	Evidence	Responsible
Data	Number of employees using companies benefits / Type of benefits used	HR manager / Employees repre-
		sentatives
Documenta-	Description of the benefits policy	HR manager / Employees repre-
tion		sentatives
Informants	What are the benefits you have? How is the satisfaction with the benefits?	HR manager / Employees repre-
	Participation committee effectiveness / Union role.	sentatives
Observation	Look at the quality of the services (Medical Centre, Canteen, Childcare, Dor-	HR manager / Employees repre-
	mitories)	sentatives

Reactive	Formal	Deployed	Autonomous	Way of life			
Industrial relations, Welfare and Job Satisfaction							
The company has	There is a participa-	There is a participa-	The company seeks	Employees and			
no focus on Indus-	tion committee but	tion committee but	to improve Job satis-	management regu-			
trial relations or	no union is allowed.	no union is al-	faction by offering	larly communicate			
welfare as topics	The company has	lowed. The com-	good welfare ser-	about ways to in-			
such as collective	some basic welfare	pany has good wel-	vices to employees.	crease safety and			
bargaining or social	services. The partic-	fare services. The	The participation	Job satisfaction. All			
responsibility ac-	ipation committee is	participation com-	committee is effec-	instruments, bene-			
	elected but has little	mittee is elected but	tive in ensuring high				

tivities are un-	power on influenc-	has power on influ-	compliance with	fits, and social ser-
known. Job satis-	ing OHS compli-	encing low cost and	OHS standards.	vices, are available
faction is very low	ance.	highly visible OHS		and used effectively.
and welfare ser-		compliance.		Union and participa-
vices are given				tion committee are
only after attrition				present and en-
with employees.				gaged.

13. Scoring sheet

Item	Score	Reason for selecting score			
OHS maturity assessment					
Leadership commitment and					
communication					
Business Policy					
Relation with contractors					
Relation with buyers					
Objectives, Targets & Perfor-					
mance Measurement					
Training					
Workforce Involvement					
OHS structure and accounta-					
bility for OHS results					
Accident Investigation					
Unsafe Behaviors and Unsafe					
Work Conditions Reporting					
Legal requirements, Auditing					
and Reviews					
Industrial relations, Welfare					
and Job Satisfaction					

Scoring 1-5, NA (1=Pathological, 2=Reactive, 3=Calculative, 4=Proactive, 5=Generative, NA=not applicable)

Appendix 5: Productivity Maturity Level Assessment

The productivity maturity assessment addresses the following 11 organizational dimensions:

1. Leadership commitment

- a) Managers routinely go to the spot of a problem in production to assess the actual situation and talk to production workers.
- b) Managers are aware of the productivity initiatives and are directly involved in them
- c) There are qualified and available human resources for the successful implementation of improvement projects

	Evidence	Responsible
Data	Number of full time dedicated employees or equivalent / Seniority level / Years of improvement experience / Number of managers experts in im- provement	Production Manager
Documenta- tion	Projects and improvement documentation	Production manager
Informants	What are the improvement initiatives? Who participate in the projects? Who is the driver of the projects?	Production manager
Observation		

Reactive	Formal	Deployed	Autonomous	Way of life			
Leadership alignme	Leadership alignment						
No leadership	Leadership is some-	Leadership aligned	Leadership is	Trained and com-			
alignment for pro-	what aligned with	with process im-	aligned with vital	mitted resources			
cess improvements.	process improve-	provements, visible	few metrics, visible	supporting projects			
	ments, but visible	and active selection	selection and review	are available.			
Company execu-	and active selection	and review of pro-	of projects. Trained				
tives demonstrate	and review of pro-	jects.	resources are availa-	Top management			
no understanding	jects are not in		ble in all depart-	has full understand-			
of the improvement	place.	Specialists and se-	ments and units.	ing and faith in im-			
approach.		lected employees		provement philoso-			
	Some specialists are	are available to sup-	Leadership demon-	phy.			
	available to support	port projects.	strates good under-				
	projects.		standing and has	Leadership prepared			
		Leadership demon-	faith in improvement	for accelerated im-			
	Executives demon-	strates an under-	methodology.	provement.			
	strate a basic under-	standing for im-					
	standing of the im-	provement strategy	Leadership commit-				
	provement ap-	but do not have full	ted but not prepared				
	proach.	faith.	for accelerated im-				
			provement.				

2. Employee involvement

- a) There is a formal process in place to solicit ideas and suggestions for improvements from all employees and to recognize their participation. (E.g. suggestion systems, quality circles, incentive programs, etc.)
- b) There is a formal process for production workers to regularly receive feedback on problems detected in downstream processes and at the customer.
- c) There is a formal process in place that provides shop floor workers the opportunity to work in groups to address performance and quality issues.
- d) Employees know the seven wastes, are actively involved in identifying waste in their processes, and are empowered to work to reduce or eliminate the waste.
- e) Shop floor employees understand and can use common performance metrics to monitor and improve production processes.
- f) Improvement projects are structured, planned, and time boxed; successes are recognized and expanded throughout the plant. (E.g. projects have champions responsible for implementation, action items have responsibility assigned, and implementation timing milestones are established.)
- g) Many of the improvements made throughout the plant involve minor or no capital investment. (E.g., the improvement process is dominated more by small, incremental improvements than by large scale, capital intensive projects.)
- h) Plant management communicates with shop floor workers regarding employee satisfaction and organizational objectives at least twice per year.
- i) Employees are able to accurately describe the organizations goals and how their job contributes to the achievement of those goals.

Evidence					
Data	Number of improvement suggestions (Total / implemented/outcomes) / Number of employees				
	participating in group projects				
Documentation	Description of the employees suggestions program / Documentation of group projects/teamwork				
	and participants				
Informants	Do you have an improvement process? Who is involved in improvement?				
Observation					

Reactive	Formal	Deployed	Autonomous	Way of life			
Employee involvement							
Little or no in-	Involvement of se-	People form cross-	Quality improve-	50% or more in-			
volvement of peo-	lected people in pro-	functional teams	ment, problem solv-	volved in teams;			
ple in process im-	cess improvements	whenever a problem	ing and corrective	open access to top			
provements	to some extent. No	arises.	action teams in	management; em-			
	systematic effort to		place. 25 to 50% of	powered to make			
	involve people in	Processes for cap-	employees involved	improvement and			
	improvement.	turing employee	in teams. People are				

	suggestions and for	able to relate im-	stop the process for
	giving feedback to	provement projects	quality.
	employee are in	to organizational	
	place but not used	goals. Processes for	
	regularly.	capturing employee	
		suggestions and for	
		giving feedback to	
		employee are in	
		place and running.	

3. Training

- a) An ongoing education/training program has been developed for all employees, including new hires, transfers, and promotions.
- b) Participation in relevant professional organizations is supported. Professional certification processes are supported.
- c) The education and training needs of all employees are evaluated annually, and progress is reviewed quarterly.
- d) Promotions, new hires, and transfers receive an initial education and training needs assessment and plan.
- e) Education and training requirements are evaluated for all newly formed improvement teams.
- f) All employees have received improvement education tailored to their job.
- g) Key employees are pursuing, or have achieved certification through relevant professional organizations.
- h) All employees are trained in basic problem solving skills.

	Evidence	Responsible
Data	Number of trained employees (shop floor / staff / Managers) / Number of	HR manager / Production man-
	hours training by employee	ager
Documenta-	Description of type of training available (basic, specialists, technical, behav-	HR manager / Production man-
tion	ioral)	age
Informants	What types of improvement training do you have? How do you identify the	HR manager / Production man-
	need for improvement training?	age
Observation		

Reactive	Formal	Deployed	Autonomous	Way of life
Training				
No formal training on improvement or quality improve-	Selected team mem- bers have been trained. Some em-	Lean training is de- ployed across the organization. Team	Team members have good understanding of lean and process	Lean/improvement is integrated in core operations and lean
	ployees are trained	members are trained		

ment tools, meth-	on basic lean tools	on different tools	improvement meth-	experts are fre-
odologies or even	and facilitators are	according to needs	odologies. Employ-	quently spotted
concepts. Each em-	available.	(5S, Lean flow,	ees have both tech-	among employees.
ployee uses its own		Pull, Value stream,	nical and behavioral	
skills and experi-		Visual manage-	skills to implement	
ences for problem		ment)	lean and improve-	
solving.			ment projects.	

4. Continuous improvement

- a) Kaizen meetings and events are in continuous operations
- b) Managers and workers initiates improvements of all tasks they are involved in and pose suggestions to colleagues whenever improvement ideas and possibilities appear
- c) A standardized operating procedure (SOP) has been developed to support continuous improvement and is used to train operators for each production process.
- d) Operators can stop the line when a defective unit/part is found or when they cannot complete their process according to the SOP.
- e) Error proofing devices and methods has been implemented to eliminate the top production defects for each work area.
- f) Every production process has the SOP posted within view of the worker performing the process.
- g) Organization uses intensively problem solving tools for continuous improvement
- h) External and internal customers' concepts are understood and tied to continuous improvement methods.

	Responsible	
Data	Data showing number and type of errors / trends in errors / number of SOP	Production manager
Documenta-	Description of problem solving methods based on use of data and perfor-	Production manager
tion	mance indicators	
Informants	Explain how you measure errors and improve the process. Do you have SOP?	Production manager
	How is SOP used? Who is involved in continuous improvement?	
Observation	Look for SOP at the production line / Look for error proofing devices in the	Production manager
	production line. Look for implemented improvements	

Reactive	Formal	Deployed	Autonomous	Way of life
Total Quality Focus				
Errors are in-	Although errors	Organization uses	Data driven continu-	Zero-defect quality;
spected and cost of	happen but some in-	data driven problem	ous improvement is	organization uses
scrap and rework is	itial thoughts prevail	solving methods.	done extensively and	data driven problem
accepted.	to implement or im-	Data collection is	efficiently, and peo-	solving methods
Deal with customer	provement systems	systematic, although	ple know the tools	across the spectrum.
complaints individ-	using lean/improve-	not done exten-	needed to advance	Continuous Im-
ually. No under-	ment methods.	sively.	the continuous im-	provement is part of
standing of the	Organization use	Some improvement	provement in the	company culture
connection be-	data driven problem	methodology evi-	company. All associ-	mindset with little
tween Continuous	solving methods but	dent. All standard	ates trained. Open	interference from
Improvement and	data collection pro-	work procedures	documentation and	management.
work standards.	cesses are not sys-	can be seen in most	dashboards used to	Employees have
Insufficient data	tematic and in place.	areas. Process own-	track improvements.	quick and free ac-
available for key	Improvements usu-	ers know the what,	Standard work pro-	cess to all standard
processes needing	ally come from	when, where, why	cedures are current	work.
improvement and	management, engi-	and how of their ar-	and posted in appro-	
no formalized im-	neering, supervision	eas. Ownership	priate areas.	
provement methods	or when a customer	taken to use stand-		
exist.	complaint is re-	ards and keep them		
	ceived.	current.		
	Some standard work			
	procedures exist to			
	show how the pro-			
	cess functions but			
	are neither current			
	nor displayed.			

5. Value stream mapping

- a) The core processes of the business are mapped and known to all the employees
- b) The main characteristics of each value stream are known (bottlenecks, improvement opportunities, critical points)
- c) Link between value stream mapping and continuous improvement established.

	Evidence	Responsible
Data	Number of mapped value steam processes / outcomes	Production manager
Documenta-	Maps and description of value stream processes	Production manager
tion		
Informants	Do you use value stream mapping? How do you use	Production manager
	VSM?	
Observation	Look for the maps of value stream processes	Production manager

Reactive	Formal	Deployed	Autonomous	Way of life
Value stream mapp	ing		•	· •
No process is mapped according to the value stream.	An understanding of VSM has been achieved. Some at- tempts have been made to map some of the processes.	A number of people have been trained in VSM, critical pro- cesses mapped. No improvements yet.	Most understand value of VSM. Map- ping has uncovered opportunities for im- provement. Action plans are in place. Rapid improvement	Most processes mapped with results of action plans rec- orded. Continuous improvement is con- nected to value stream mapping and
			blitzes proceeded by	organizational ob-
			VSM.	jectives.

6. Control through Visibility

- a) Updated display boards containing daily targets and outputs, job training, safety, operating measures, production data, quality problems and root cause analysis are readily visible throughout the plant.
- b) Check-sheets describing and tracking the top defects are posted and up to date at each workstation. (E.g., each operator is aware of the key quality points and defect history of the process they are doing.)
- c) There is good, effective communication between production shifts in the plant. (E.g. equipment, quality problems, production schedules, etc. are communicated daily, and production areas are left "ready to go" by the previous shift.)
- d) Processes are equipped with call lights or signals that workers or machines can call for assistance when a problem is encountered.
- e) Marked squares on the floor or other signaling devices are used to aid and activate production.

	Responsible	
Data	Number of techniques/ Number of units using visual management techniques	Production manager
Documenta-	Description of the objectives and implementation of visual management tools	Production manager
tion		
Informants	Do you use visual management? What tools of visual management? How do you use the tools? What are the benefits?	Production manager
Observation	Look for visual instruments in the shop floor and offices	Production manager

Reactive	Formal	Deployed	Autonomous	Way of life
Control through visibility				
No visual manage-	Visual management	Different visual	Organization uses	Visual management
ment in place.	tools and techniques	management tech-	visual management	tools and culture are
	are introduced to the	niques are known to	tools in order to	established and used
	business. The adop-	all the areas and de-	meet emerging	in daily practice
	tion of the visual	partments of the or-	needs and objec-	across the organiza-
	management tech-	ganizations (Goal-	tives. However,	tion with almost no
	niques varies in in-	setting and perfor-	management is still	intervention from
	tensity and fre-	mance tracking,	directly involved in	management. Visual
	quency among de-	scheduling and pro-	the deployment of	management is con-
	partments. The tech-	duction control, call	the Visual manage-	nected to continuous
	niques still not used	lights, marked	ment techniques.	improvement.
	effectively in prac-	squares, idea shar-		
	tice.	ing and team com-		
		munication, report		
		kaizen results and		
		awards)		

7. Accounting support to Productivity

- a) Accounting and financial measures that strategically encourage lean/improvement activities are used to proactively drive and then measure business progress and performance.
- b) The accounting system enables a balanced set of financial and non-financial measures to assist decision-making and forecasting.
- c) The financial system has been overhauled to ensure fast and efficient processing of information as required and is accessible to users as needed.
- d) Work breakdown structure allowing consistent and timely capture of business costs and the reporting of financial benefits achieved by improvements.

	Evidence	Responsible
Data	Accounting data supporting lean/improvement activities	Production manager
Documenta-		
tion		
Informants	Do you use accounting information for improvement?	Production manager
Observation		

Reactive	Formal	Deployed	Autonomous	Way of life		
Accounting support	Accounting support to Productivity					
Accounting system	There is awareness	Staff has been	Key value streams	Accounting system		
provides basic fi-	that accounting has	trained to connect	are using lean/im-	provides financial		
nancial data based	a role in lean/im-	lean/improvement	provement account-	data based on meas-		
on cost accounting.	provement. Some	to accounting. Pilot	ing data. Decisions	urements at the		
There is little	staff has been	project has begun;	are being made us-	value stream level		
awareness of ac-	trained and initial	departments meas-	ing lean/improve-	and provide support		
counting's role in	analysis has been	uring and targeting	ment financial data.	for lean/improve-		
supporting lean/im-	undertaken.	waste in its pro-	Current cost and rev-	ment.		
provement initia-		cesses.	enue methods are	Accounting aligned		
tives			being reviewed to	with lean improve-		
			accommodate lean	ments: goals and		
			projects.	outcomes.		

8. 5S/Housekeeping

- a) The plant is generally clear of all unnecessary materials or scrap and isles are clear of obstructions.
- b) Lines on the floor clearly distinguish work areas, paths, and material handling isles. Signs clearly identify production, inventory staging, and material drop areas.
- c) A daily checklist exists in each work center that identifies housekeeping activities to be performed.
- d) There is "a place for everything and everything in its place:" every container; tool and part rack is clearly labeled and easily accessible to the user. People using tools, parts, fixtures, quality gages, etc. know where to find them.
- e) A radar chart/spider diagram chart displays each area's workplace organization performance.

	Evidence	Responsible
Data	Number of areas with 5S implemented and status of implementation	HR manager
Documentation	Description of 5S project	HR manager
Informants	Do you use 5S? What are the status and the challenges of 5S?	HR manager
Observation	Look at the 5S status on the shop floor and staff offices	HR manager

Reactive	Formal	Deployed	Autonomous	Way of life		
5S/housekeeping	5S/housekeeping					
Disruptive and	Company aware of	Most areas have be-	Audit teams assess	Clean, orderly, self-		
messy, no formal	5S principles but no	gun 5S. Materials	5S standards. Teams	maintained; always		
workplace organi-	training underway.	have permanent po-	investigate root	"tour ready" without		
zation standard in	Non-routine clean-	sitions, cleaning	causes of disorder.	management inter-		
place. No order,	ing takes place.	schedule followed.	All areas working on	ference.		

area untidy, materi-	Employees partici-	standardizing 5S	
als have multiple	pate, support, under-	processes.	
locations	stand and do most		
	cleaning		

9. Preventive maintenance

- a) Maintenance team managers and workers have been trained in the basics of TPM.
- b) Machines have all safety guard devices operative, and are locked out immediately when broken down. (E.g., safety guards are not disabled or removed. Malfunctioning equipment is not allowed to continue operating in production.)
- c) Preventive maintenance activity lists are posted in work areas and item completions are tracked over time.
- d) Preventive maintenance activities are focused on increasing utilization and minimizing cycle time variation. (E.g. capacity utilization is tracked and cycle time performance is monitored for each machine and issued in maintenance activity planning. The maintenance team is evolving from preventive to predictive abilities.)
- e) Preventive maintenance responsibilities are defined for both maintenance and production workers.(E.g. operators are doing routing tasks like checking oil, cleaning machines, & changing tools.)
- f) Maintenance is scheduled as part of the overall production plan.

	Evidence	Responsible
Data	Number of employees trained in preventive management/data used for pre-	Production manager
	venuve maintenance	
Documenta-	Preventive maintenance policy	Production manager
tion		
Informants	Do you have preventive maintenance? How it works? Who does the pre-	Production manager
	ventive maintenance?	
Observation	Look at the preventive maintenance schedules and devices at the shop floor	Production manager

Reactive	Formal	Deployed	Autonomous	Way of life
Preventive maintena	ance			
Reactive or break-	Planned mainte-	Data captured	Employees proac-	Preventive mainte-
down maintenance	nance is applied	used to plan	tively maintain	nance is spread
is widely used. Em-	by specialists in	maintenance.	equipment and	across the supply
ployees have no re-	line with process	Employees in-	process conform-	chain (involving
sponsibility for	needs. Key	form mainte-	ance using a for-	suppliers) in order to
equipment. Capac-	equipment cur-	nance of possible	mal maintenance	maintain process
ity assumed to be	rent capacity reg-	problems. Em-	management pro-	conformance. Plans
available by con-		ployees contrib-	cess (such as	recognize capacity
tracting out to third				issues and include

parties or buying additional equip- ment.	ister in place, in- cluding third party suppliers.	ute towards pro- cess conform- ance. Project plans or factory or project sched- uling in place to objectively man- age availability	TPM). Mainte- nance called in only when prob- lems are outside operator capabil- ity.	contingency to man- age risk and train workers.
		or performance		

10.Structured Flow/Pull Manufacturing

- a) Part travel distances have been analyzed and reduced by moving equipment and workstations closer together. (E.g. wasteful material conveyance has been eliminated by reducing the distance between processes, work cells, process groups, or material staging areas.)
- b) Subassembly or production areas that supply a main production line or cell(s) do not change-over early to build inventory buffers, etc. (E.g. changeovers are synchronized across related production processes.)
- c) Defective items are immediately detected when they occur in the production process. (E.g. very seldom does a bad part make it to a downstream process or to the customer with a lot of suspect parts in between requiring additional inspection.)
- d) Processes and equipment are arranged to facilitate a continuous flow of work through production and not arranged in machinery or process groups. (E.g. WIP inventory does not accumulate after processes. Machines or equipment groups do not bottle-neck the material flow, etc.)
- e) U-turn layouts and U-shaped cells have been implemented on the shop floor to enable one-piece (continuous) flow of material through production.
- f) There is an effort to level production schedules by spreading the monthly purchase volume evenly over the period. (E.g. the daily production volume for a part does not vary substantially from one day to the next based on daily release quantities,)
- g) The takt time is used as the basis to determine process cycle times and allocate work throughout the production process. (E.g., production processes are designed with cycle times that does not exceed the takt time.)
- h) Material flow or movement in the plant is dependent on individual pull signals (via Kanban, etc.) from downstream workstations as parts or materials are consumed.
- Production supervisors are not motivated to produce more parts than the subsequent processes require. (E.g. supervisors are not motivated to "build to make the numbers" regardless of downstream process requirement.)

	Responsible	
Data	Data about Takt time (= Production time available / Customer volume) / inven-	Production manager
	tory level	
Documenta-		
tion		
Informants	Do you use flow or takt-time concepts? Do you use U shape or other shapes?	Production manager
Observation	Look at the production line for inventories/Kanban/flow/U-shape/Cells/Pull	Production manager

Reactive	Formal	Deployed	Autonomous	Way of life		
Structured Flow Manufacturing						
Flow between pro-	A few key processes	Key processes	Majority of inter-	Process flow		
cesses is disjointed.	are aligned for flow	within value	nal and a few ex-	throughout all value		
Push scheduling	and stability im-	streams are or-	ternal processes	streams (internal and		
commonly utilized	proved to reduce in-	dered to enhance	are adapted to en-	through the supply		
with little integra-	ventory/buffer lev-	flow and reduce	hance value	chain) is continuous,		
tion with cus-	els.	inventory/buffer	stream flow and	in time with actual		
tomer/supplier pro-	Individual activity	levels.	minimize dis-	demand, with dis-		
cesses.	processes are par-		tance travelled,	tance travelled and		
	tially adapted to suit		inventory/ buffer	inventory/ buffer		
	flow.		levels or time de-	levels minimized.		
			lay.	Information is al-		
			Processes are sta-	ways available to		
			ble throughout	enable decision-		
			the internal and	making when re-		
			external value	quired to enhance		
			stream. Pull	flow. Processes are		
			scheduling is uti-	fully adapted and in-		
			lized throughout	tegrated to optimize		
			the organization.	flow.		

11. Suppliers and customers' relationships

- a) Suppliers and customers have early involvement in the design process for new products.
- b) Suppliers and customers are at least quarterly provided feedback on delivery, quality and service.
- c) The supplier and customer are actively engaged in initiatives regarding the non-price areas of cost.
- d) Suppliers deliver materials to point of use.
- e) There are specific goals/objectives for the supply base for total dollars spent to be at point of use, supplier managed inventory and consignment.
- f) On-time performance from the supply base is at least 95% on time to the due date.
- g) The company consistently provides technical expertise to supply partners to activate their lean/improvement efforts.
- h) Long term agreements exist for at least 80% of total purchase dollars.

	Responsible	
Data	Performance Indicators with suppliers and customers	General manager / Production
		manager
Documenta-		
tion		
Informants	What type of cooperation for production improvement do you have with your	General manager / Production
	suppliers/customers? Are there sharing of experiences and risks?	manager
Observation		

Reactive	Formal	Deployed	Autonomous	Way of life			
Customers and Suppliers relationships							
Suppliers and cus-	Feedback is given to	There is a manage-	The organization	The organization op-			
tomers relationship	companies about	ment system in	and its suppliers and	erates in long term			
is strictly based on	improvement indica-	place between the	customers have a	partnership with it			
short term financial	tors. Companies are	organization and its	well-functioning	suppliers and cus-			
results	encouraged to im-	suppliers/customers	management system	tomers. Benefits of			
	prove quality. Cus-	for quality and cy-	covering all aspects	improvement and			
	tomers contracts and	cle-time improve-	of relationship	experiences are			
	compliance reports	ment. The use of the	(Quality, cycle time,	shared between the			
	in place	system is restricted	new customers' re-	two parties includ-			
		to critical processes.	quirements).	ing long-term objec-			
				tives.			

12.Scoring sheet

Item	Score	Reason for selecting score			
Productivity (Lean) maturity assessment					
Leadership commitment					
Employee involvement					
Training					
Continuous improvement					
Value stream mapping					
Control through Visibility					
Accounting support to					
Productivity					
5S/housekeeping					
Preventive maintenance					
Structured Flow/Pull Manu-					
facturing					
Customers and Suppliers rela-					
tionships					

Scoring 1-5, NA (1=Reactive, 2=Formal, 3=conditions, 4=Autonomous, 5=Way of life, NA=not applicable)

Appendix 6: Template for company report

The final report for each company should contain the following items:

1. Title

The title should contain the following information:

POSH-BD Baseline Study Report Nr. XX Company name XXX

2. Data collection

- 2.1.Participating researchers
- 2.2.Dates for data collection (all contacts)
- 2.3. Circumstances, constraints, availability of interview persons, quantitative data, documents

3. Description of company

3.1. Mother company

- 3.1.1. A narrative about history and situation of the company, including the following:
- 3.1.2. Foundation, ownership, historical development
- 3.1.3. Main product, suppliers, markets, costumers
- 3.1.4. Economic situation (yearly turnover, profit, investment)
- 3.1.5. Expectations and plans for the future

3.2. The production site

- 3.2.1. Description (location, size, production, history)
- 3.2.2. Structure (department, management)
- 3.2.3. Main equipment and machinery
- 3.2.4. Main products and costumers
- 3.2.5. Human resources management (salaries, working hours, overtime, skills, training, industrial relations)
- 3.2.6. Expectations and plans for the future

3.3.The selected production line

- 3.3.1. Description of production, main products, main equipment
- 3.3.2. No of workers and supervisors

4. Productivity

4.1.Quality management

4.1.1. Description of the quality management system (incl. figures on quality defects, remakes, cost)

4.2.Production management

- 4.2.1. Description of the production and management system, changes in production such as change of product (incl. figures on production)
- 4.2.2. Lean and productivity
- 4.2.3. Description of procedures and systems for productivity improvements

4.2.4. Productivity improvement practices (incl. data on improvement initiatives, kaizen, outcomes of initiatives

4.3. Productivity maturity score

4.3.1. Indication of score and reasons for choosing this score (including sub-dimensions)

5. Health and safety

5.1.HS management

5.1.1. Description of management system, structure, activities, committees

5.2.OHS performance

- 5.2.1. Risk assessment procedures and practices
- 5.2.2. Registration of accidents, rates and follow up on accidents
- 5.2.3. Training and worker involvement

5.3.OHS maturity score

5.3.1. Indication of score and reasons for choosing this score (including sub-dimensions)

6. Discussion and conclusion

6.1.Strength and weaknesses of production

6.1.1.1.Discuss the main points regarding strengths and weaknesses of production

6.2.Strength and weaknesses of health and safety

6.2.1.1.Discuss the main points regarding strengths and weaknesses of health and safety

6.3.Possibilities for integration of productivity and OHS

6.3.1.1.Discuss with concrete examples how productivity and OHS can be integrated in practice

7. Appendices

- 7.1.Form with Company information
- 7.2. Form with production site information (incl. selected production line)
- 7.3.Sheets with summaries of interviews
- 7.4.Observation form incl. possibilities for improvement
- 7.5.Score sheet for productivity
- 7.6.Score sheet for OHS

Appendix 7: Procedure for uploading data

1. Dropbox

In Dropbox, the company reports and data are saved under the groups that generated them (Group A: 17 reports / Group B: 16 reports / Group C: 17 reports)

2. Access and security of confidential information

Malek is responsible for uploading and maintaining the data related to reports on Dropbox

Appendix 8: Checklist and manual for quality control

The Procedure and checklist for quality control of baseline company reports should be done according to the following instructions:

- 1. The responsible researcher (senior researcher or Ph.D. student) prepares the report supported by the research assistant.
- 2. Both the responsible researcher and the research assistant fill out the scoring sheets independently of each other. Scores are compared and in case of differences reasons for the different scores are assessed and the two persons seek to find a shared scored. If in doubt or disagreement a senior researcher is consulted.
- 3. The draft report is submitted to a senior researcher who has not been involved in writing the report.
- 4. The senior researcher checks the presence of all required documents and the quality of the reports by filling the checklist below. The name and date of completing the quality control is indicated at the front page of the report, and the filled checklist is attached as an appendix to the report.
- 5. In case of missing data, the reasons and the attempts to secure the data are explained in details.

The following table contains the checklist of items for quality control of baseline company reports.

Name of senior researcher			
Date of quality control			
	OK	Changes required	Comments
The data sampling has been carried out as required and all data collected			
The report template has followed			
The text and the assessments have the required quality			
Basic company data complete			
Minutes of interviews complete with questions and answers			
Score sheet for observation of pro- duction line complete			
Score sheet for productivity ma- turity incl. reasons for scoring com- plete			

Score sheet for pr	roductivity i	na-			
turity mer. reasons for scoring com-					
plete					
Quantitative data	keyed in to				
spreadsheet comp	olete				
	No	Yes	Explain why		
Any data miss-					
ing					
ing					

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