

Towards an assessment approach promoting flexible value-adding meetings in industry

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Abstract

Assessment approaches in manufacturing companies has the potential of providing improvement potential issues. The purpose of this paper is to investigate potentials of an initial assessment approach of meetings in production. The assessment approach is based on a model regarding organization and information system structures, tested and validated in an industrial company in Sweden. Results show that the assessment approach could be used in order to evaluate what area to improve and what the company are strong within. The assessment approach also implies if the company are information-oriented or more organizational-oriented in their approach when creating meeting arenas. This could be used in future meeting strategies to improve the flexibility and value of the meetings. In further research, the next step is to develop, test, and validate a process for continuous improvement of meetings, as well as to apply the model for development of organization and information system structures in new scenarios such as ‘Personnel changes of positions and roles’, ‘Training and workplace learning’, and ‘Automation/digitalization’.

Keywords: PDSA, learning organization, communication

1. Introduction

Industrial development with increasing product- and production system complexity, rapid changes etc, require strategies for information distribution, a work environment facilitating continuous learning as well as efficient communication between people with different functions. This requires development of organizational and information structures developed in parallel [1]. In meetings people, knowledge, information and systems are joined for a value-adding purpose, however, information systems can never store all the knowledge/information needed – there will always be need for the knowledge that are made available only through humans. Also, the organization system cannot be sufficiently efficient without a good support from the information system that stores, presents, handles the information. Thus, the two systems need each other.

When products and systems are becoming more complex, more people need to be involved to understand and decisions need to be made faster, hence meeting processes and structures need a strategic development. To continuously improve meetings, this paper assumes that assessment approaches are valuable to contribute to further development of meeting structures in production. Assessment tools are commonly used and considered useful for identification of potential areas of improvement, and best practices within plants [2, 3].

This paper presents an assessment approach based on the MEET-model, previously called the OS-M-IS-model) [4]. The purpose of the MEET-model is to visualize aspects needed to be considered regarding both the information system and the organization system when designing meeting strategies and conditions.

2. Theoretical framework

2.1 Assessment models/methods

There are different approaches that assess different aspects of production. From a Performance Measurement Systems (PMS) perspective Gomes et al. [5] reviewed 154 papers from 1989 to 2000, finding that most studies utilize a corporate approach (57.1%) or focused on production (28.6%). They conclude that assessment approaches in production need to be grounded on information availability, reliability and responsibility. Almström and Kinnander [6] suggest an approach, based on a systems perspective, to assess the productivity potential on a shop-floor level by posing 40 questions distributed over 11 topic areas (strategy – goals, work methods, maintenance, competence, cleanliness and order, material handling, changeover, continuous improvement, calculations, planning and quality). Sundkvist [7] proposes a methodology that assesses the profitability by linking three parts: i) Almström and Kinnander’s Productivity Potential Assessment method [6], ii) a predetermined time system (PTM) called sequential based activity and method analysis (SAM), and iii) a financial study that includes direct salary, direct material, material overheads, production overheads and other costs for supporting the production system. Further Mattsson [8] developed a method that assess the subjective complexity of assembly work tasks by quantifying results from questionnaires. The CompleXity Index (CXI) is based on 26 questions distributed over 6 topic areas (product variants, work content, layout, tools and support tools, work instructions and a general view). From a general organizational learning perspective, Crossan et al. [9] evaluate frameworks by assessing:

- strategic renewal tension
- multilevel framework
- one level affects the others

- process linking levels
- cognition/action link

From an information model perspective, Hedman et al. [10] reviewed 20 scientific publications on different methods, concluding with different requirements matching six different modelling objectives. Hence, there is a wide range of assessments of progress and performance of production systems are found in literature and industry, but not specifically addressing assessment of value-adding meetings in industry.

2.2 MEET-model

Meetings between people for specific purposes can take many forms. For example they can be formal or informal, and are characterized by location, rules and norms for information exchange etc [11]. Information systems and organisation systems must work well together in order to achieve a high-quality, innovative, and efficient organisation [4]. To create appropriate conditions enhancing knowledge sharing among employees, and further organizational learning, knowledge management is vital [12]. An innovative structured arena that can glue the systems together is important to achieve flexible organisations [13]. Companies are getting more and more global and need a strategy for effective meetings and flexibility in time and space. Four different time-space areas has been used in these studies [14]:

- Same time/same place
- Same time/different place
- Different time/same place
- Different time/different place

In order to examine these three areas; time-space flexibility, organisation systems and information systems, a model was developed, illustrated in Fig. 1. Within the MEET-model, the Organisation system and Information system are divided into five sub-areas. Meetings are divided into four different time-and space combinations.

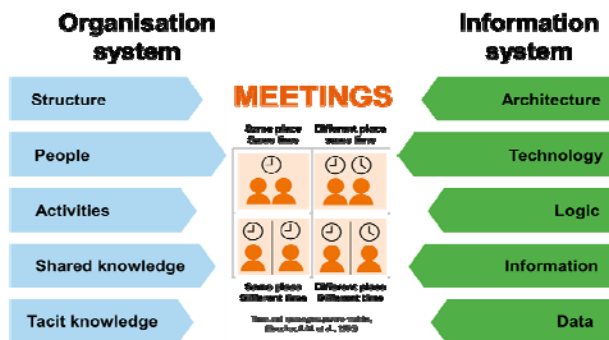


Fig. 1. The MEET-model, modified from [4].

Below follows a brief explanation to each of the two main areas.

2.3 Organisation system(OS)

The organisation system includes structure, people, activities, shared knowledge, and tacit knowledge [15]. Individual's skills and know-how is difficult to codify as it is embedded in

individuals experiences. However, explicit knowledge can be more easily communicated in written documentation [ibid]. A structure for organizational learning is described by Crossan, et al. [9]. This structure inclines learning/renewal in organizations in four processes (Intuiting, Interpreting, Integrating, and Institutionalization). Further these structures are regarded in three levels (Individual, Group, and Organization).

2.4 Information system (IS)

The information system includes architecture, technology, logic, information and data. Architecture and it is the highest level of Meet model (Figure x) and is the overall structure, both software and hardware. This strategy should be aligned with designing processes as well as implementing and evaluating information spaces [16]. Already in 1987, insights from Brancheau and Wetherbe [17] was that organisations for the future, would be those who integrated appropriate new IS technologies into their entire operation. This is still true, almost 25 years later. Technology is an important enabler of new collaborative work forms [18]. Further, efficient information flow rely on six aspects such as relevance, timeliness, accuracy, accessibility, comprehensiveness and format [19]. The first three are connected to the logic level in the Meet-model, seen in Figure x, while the others belong to the information level, and plays an important role for information quality [20].

2.5 PDCA and PDSA

Meetings are crucial for achieving commitment, enabling re-using and refining achieved knowledge, supporting daily and long term improvements and development of a "Right from me"-behavior. Learning organizations stress the importance of dialogues for reflection [21]. Meetings, discussion-forums etc are learning arenas and crucial means for reflective dialogue-relations along a flow [22]. The flow-dialogue needs to be supported by a visual management strategy where stepwise furthering of data (information, material, products) give options for interaction as well as for mutual support from sender to receiver. It needs to consider what is communicated, how this is communicated, and visibility to achieve decision support, critical reflections and exchange of tacit knowledge.

The Japanese interpretation of the "Deming wheel" in Dr. Deming's lectures of 1950 and 1951 lead to the plan-do-check-action or PDCA cycle [23]. This cycle was integral to the Japanese QC, TQC, and QC circle activities. In the attempt to operationalize the PDCA-cycle, people engagement is crucial. Berglund [24] defines engagement as 'incentive to contribute to the common good' and has identified ten factors that constitute the ten-theme model, configuring the prerequisites for engagement. Further, Berglund, Laring & Nonas [25] have developed a structured process to improve prerequisites for engagement based on the the ten-theme model and the PDCA process. The process to achieve engagement in a company includes four workshops, corresponding to the steps P, D, C and A respectively, with structured preparations and follow ups, Fig.2.

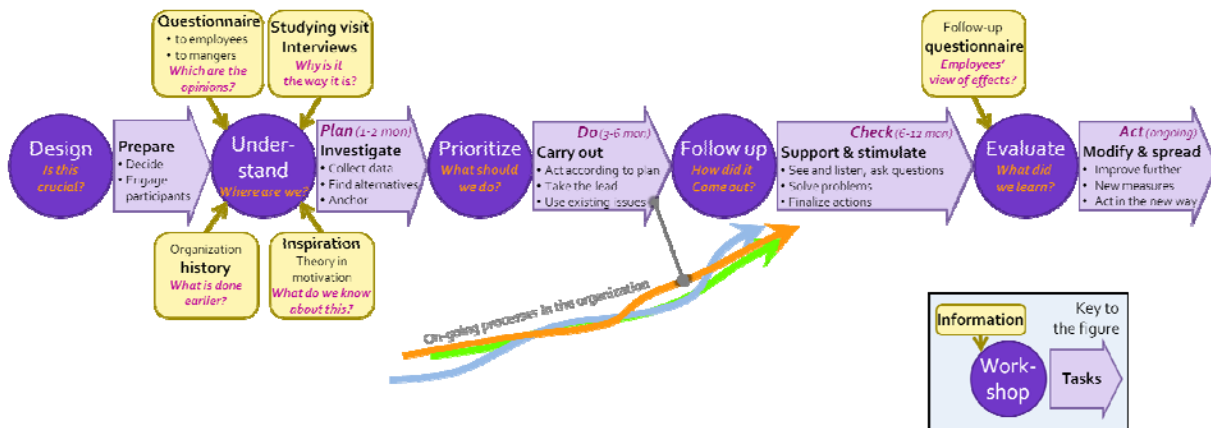


Fig. 2. An overview of the change process for engagement in an organization [24, 25, 26, 27 18]

The change process was applied and evaluated in four companies, and the structure of the imposed process was experienced positively. The initial survey, a web questionnaire, was seen as a good start for creating consensus in the working group, where there were both positive and negative opinions in the discussions. The process itself was seen as a driver for engagement, and enabling communication between colleagues achieving new insights, gave priority to “soft” issues, understanding of concepts and tools for concrete work, empowered participating managers and it created changes that were expected to improve engagement with in the organizations. Hence, the attempt to develop assessment approaches promoting flexible value-adding meetings, need to consider engagement factors and its integration in realization processes in practice.

An evolution of the PDCA cycle is the PDSA, where the S stands for Study. Deming introduced his Shewhart cycle for learning and improvement in the USA in 1986. Dr. Deming introduced a more abbreviated PDSA cycle in 1993, illustrated in figure 4, [19].

The PDSA-cycle can be used for empowering operators in their daily work. A machine operator can provide valuable insight about the efficiency of his or her process or about the usefulness of a particular machine. When that operator is empowered to use statistical and problem-solving tools in that effort, the results can be dramatic. Training in these methods thus represents important support to the empowerment process [20].

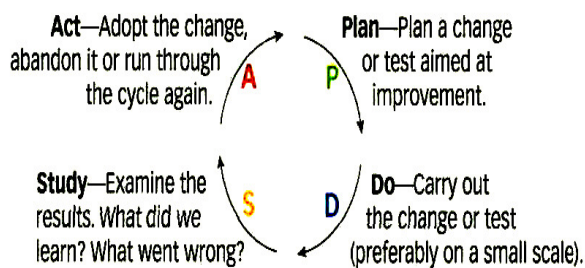


Fig. 4 PDSA cycle, adopted from deming, 1993 [19]

This method is more useful in study and learning environment. The assessment method developed in this paper will therefore use the PDSA-cycle.

3. Formulating an assessment approach for meetings

In order to formulate an assessment approach for meetings, case studies at four companies has been conducted during 2014-2016. The companies were two global companies and two small companies. The meetings of investigation were, improvement meetings, daily morning meetings, maintenance meetings and planning meetings. The companies were evaluated within the ten areas according to the meet-model and there were a clear focus in two of the companies, one company that had focused a lot on the information structure and one that had a clear focus on the organisational structure. This paper will focus on the company with organisational focus and the daily production planning meeting structure in particular in order to see the evolution within the meeting structure and also in order to validate the first step of the assessment approach.

Initially, meeting strategies, actual meeting conditions and development needs were identified at the case company. Empirical data was collected through semi-structured interviews including following questions: i) What meeting strategies occur, and what types of meetings are important in the company's operations, "current state" and "desired future state"? and ii) what are the conditions for these meetings?

Further, a specific meeting was selected for assessing strengths and improvement development needs regarding the organization system and information system. An assessment approach was then developed and tested in two rounds 2014-2016, illustrated in the PDSA- cycle in figure 5.

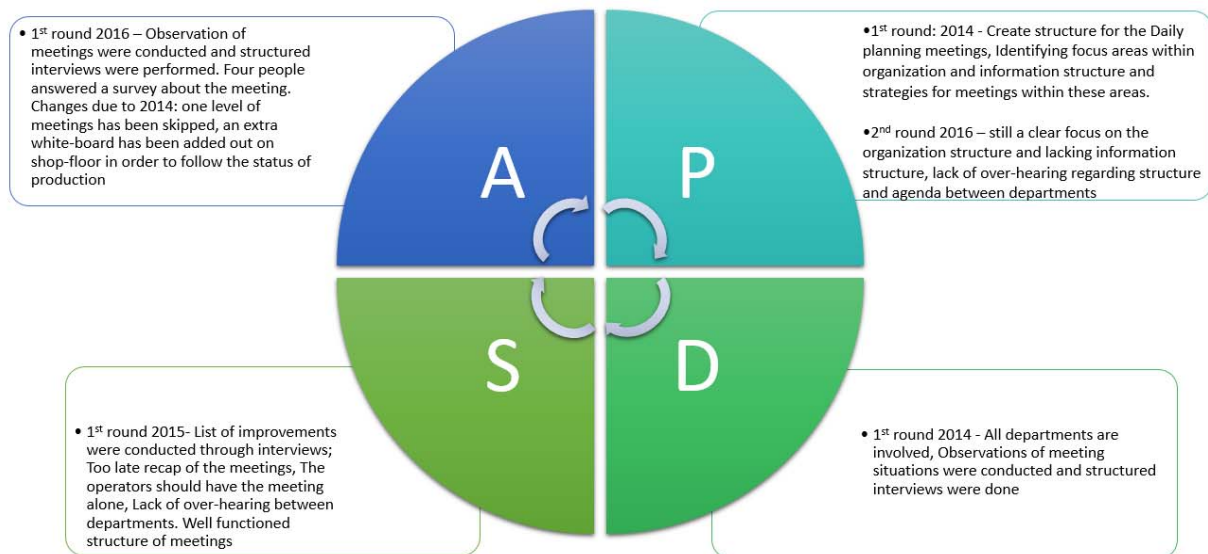


Fig. 5 Results of the PDSA-cycle for the daily planing meeting at the case company

1st round PLAN: The Company had developed and thoroughly implemented a structured model for daily production planning meetings, i.e. meetings for daily visual management (DVM). These meetings aim to support daily operations and transparency between different production departments and transparency from shop-floor to plant management. Observation and semi-structured interviews were performed with one department.. Table 1 illustrates the meetings, time number of participants and number of departments.

Table 1. Meetings performed in Daily planning

MEETINGS	Time	No. of Particip.	No. of Dep.
Up-Streams			
Team	07.00-07.07	14	4
Production leader	07.20-07.25	3	2
Production	07.40-07.50	5	5
Factory	08.00-08.15	9	9
Down-streams			
Production	08.45-08.52	5	5
Team	10.30-10.33	10	1

Two observer followed one group leaders' different meetings within his department. The meetings were six different, four up-streams and two down-streams, illustrated in table 1. In total, eight interviews were performed with at least one person per level (Operator, Production-leader, production engineer, maintenance, quality and logistics).

1st round DO: A first evaluation indicated benefits of radically increased transparency from operations to plant management on a daily basis. All departments were involved in the meetings at some point. Although, people thought that it took quite a lot of time and the flexibility was not that high, on the contrary they were very pleased with the logic and structure of the meetings. The meetings were in the middle of a cycle which decreased the quality. The production leader felt that he lost contact with the personnel since he did not have time for his daily morning round within the department.

1st round STUDY: Semi-structured interviews were performed in order to evaluate the meetings and also to document further improvements. A future development needed is to create time-space flexibility i.e. how to rapidly in real time share the information generated from the daily planning meetings to other people in the organisation. The structure and information were still very structured some the implementation of the meeting were well based in the organisation structure. The meeting time decreased when they had established the logic and agenda.

1st round ACT: Observations were done in April 2016 where two observers (one was the same as in 2014) followed the same production leader. Some changes had been done. The up-stream meeting of the production leader and operators had been removed since the PL participated in the team meeting. Notes were done in different ways compared to 2014 were everyone had the same structured paper template, in 2016 only one had the original template.

2nd round PLAN: There is still a clear focus towards the organisation structure and personnel have developed their own information channels due to lack of technical tools. Within a short term perspective there was a need to

create weekly support function planning meetings aligned with the meetings for DVM. These meetings need to be cross-functional meetings including planning, problem solving, testing, planning for logistics, preventive maintenance activities etc. The aim is that these meetings will be operated by the support functions (production engineering departments, maintenance, quality, etc.). Also the company needs to develop meeting strategies for order processes and product introductions. The meeting conditions for order processing is that the personnel have workplaces at different sites and need frequent daily contact. Here there is a need to support communication through new work procedures and virtual interaction between production teams and inventory management, logistics and market units. Also meeting strategies related to product introductions need to be developed to increase transparency both within the organization and with partners geographically distributed. Additionally to virtual meetings there is a need for physical

meetings with personnel from product development and production in order to develop new solutions, understand problems, do tests, etc

Discussion and future research

A simplified assessment of the daily planning meeting was done by filling in a web-based survey answering ten questions. The result is than illustrated according to the meet models ten focus areas with organisation structure on the left and information structure on the right. From earlier interviews there were known fact that there were a clear strategic focus towards the organisational structure which in the case of the result of the survey should point towards green or yellow fields within the left fields and red or yellow in the right fields. The result in figure 6 shows that there is a clear indication towards this assumption.

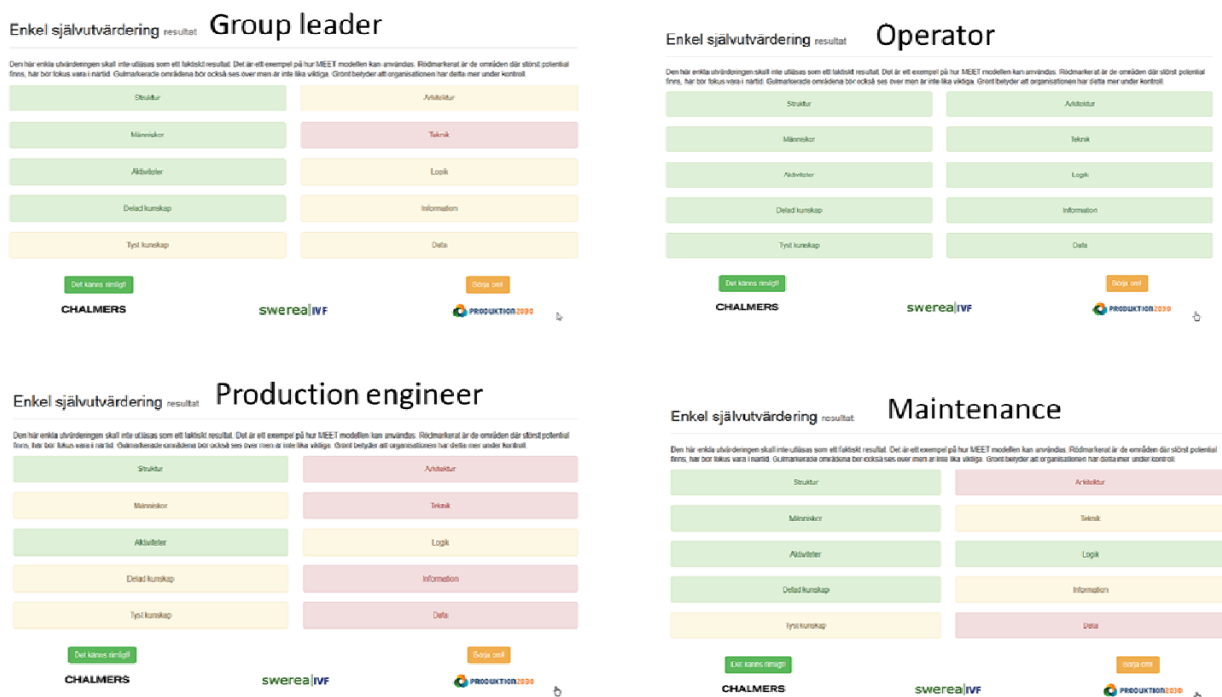


Figure 6 Evaluation of the Daily production planning meeting at the 2nd Planning round

Hence, the result in figure 6 also indicate that there is a need for more detailed information than only the survey. The result from the survey were complemented by unstructured interviews of the four persons were they described how they interpret the results from the survey. Everyone except the operator thought that the result had a solid ground of how they interpreted the meeting. In order to get an engagement in the change process it is important to set clear goals. A need to rank the bottom three areas and to develop an action plan for these seems important in order to get a learning process and in order to improve the efficiency of the meetings.

4. Further research

In further research, the next step is to develop, test, evaluate and validate a process for continuous improvement of meetings based on the issues in the MEET-model and assessment approach. The process for engagement, developed by Berglund, Laring and Nonas [25] will serve as a base for further development of the MEET-process. The aim is to support engagement in the companies’ improvement work of organizational and information system structures related to meeting.

There are other possible scenarios for application of the Meet-model such as application for Scenario ‘Personnel changes of positions and roles’ [21]. This scenario addresses the process of employees change positions or roles, including

both formal changes of positions as well as temporary changes of roles. The MEET-model may in further research serve as a base for industrial development of organizational and information system structures to achieve efficient knowledge transfer and organizational learning during personnel changes. Structures for managing personnel changes need to be developed and planned for in an organization to efficiently support individual successors as well as to gain organizational learning. There is a need to transfer knowledge not only related to technical issues, but also those related to human and organizational issues. Thus, organizational and information system structures need to include possibilities for transfer of both explicit and implicit knowledge in both formal and informal settings. This may be achieved through a combination of codifying explicit knowledge, building organized networks and creating opportunities for learning from work in practice.

Other possible scenarios for application of the Meet-model is "Training and workplace learning", and "Automation/digitalization". During these processes, meeting strategies and assessment tools are needed to develop as there are constant changes where both organisation structures and IT support needs to be developed.

5. Conclusions

Results show that the assessment approach could be used in order to evaluate what area to improve and what the company are strong within. The assessment approach also implies if the company are information-oriented or more organizational-oriented in their approach when creating meeting arenas. This could be used in future meeting strategies to improve the flexibility and value of the meetings.

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