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Understanding the Aspects of Collecting Installed Base Information in Manufacturing Context – Towards a Future Research Agenda

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Abstract

Previous studies in the manufacturing context have highlighted the important role of maintenance work, or field technicians, in manually collected installed base information (IBI). These studies have brought up various challenges related to accuracy and availability of this manually gathered IBI. However, the current research has not yet managed to identify underlying cultural and contextual aspects affecting this manual data collection work. Therefore this paper proposes a research agenda focusing on gaining deeper understanding of this data collection work by ethnographic research setting opening up new theoretical and practical insights to this part of modern maintenance work.

Keywords: installed base information, manual data collection, ethnography

1. Introduction

In the manufacturing contexts current studies have highlighted the unique role of maintenance work, or the work of field technicians, possessing specific knowledge and experience which they gain by working with customers´ equipment [1,2]. Especially when maintenance includes also actions related to preventive and predictive maintenance besides corrective maintenance [3], this customer specific knowledge gains even more potential when adding value for manufacturing customers. In the maintenance management literature this view is stressed also from the supplier perspective as "gaining and maintaining competitive advantages" under different management systems such as Total Productivity Maintenance (TPM) [4]. Within these systems the collection of installed base information (IBI) is considered as a base for making decisions of correct and accurate preventive maintenance plans for the industrial clients.

In the current developed maintenance management systems usually equipment or process integrated sensors provide IBI by remote monitoring, but still some data has to be collected manually [5]. This manually collected data typically includes operational and cost related data from service operations, such as hours spent at the site and spare parts used. Based on this data they can also design and sell value-added services that enable customers to attain improvements in productivity and cost efficiency [6]. Therefore, manually collected IBI has a significant role when managing industrial services from business perspective, both to suppliers and their clients [7].

However, current research has identified challenges with the accuracy and availability of this manually gathered IBI. Previous research has created knowledge in the field by highlighting the aspects such as time pressures [8],

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motivation, benefits and baits related to data collection [9], [5], [7], "right attitudes" [8], insufficient training and deficient data collection guidelines [10], senses of incompetency and "data collection as additional paperwork" [5], and manifold interpretations of complex equipment involved in the data collection [11]. Besides these antecedents, also the role of management, its role in defining the appropriate data quality level [12] and its commitment and "data quality awareness" has been identified as important in the pursuit of high-quality installed base data.

While much has already been done to instruct those responsible for data collection [8], this empirical evidence clearly indicates that there is space for developing the actions related to manual collection of IBI. Besides this observation, most of the current research is located to management discourse, where maintenance work is seen from the perspectives of scheduling, metrics, working specifications, utilization of labour and doing maintenance procedures [4]. Related to this the current research focusing on motivations, trainings and procedures in manually gathered IBI is a good start, but not sufficient enough for bringing us knowledge what the data collection work actually is and how do these maintenance or field technicians really do their work.

Therefore, when making this plan for the future research agenda on studying manual collection of IBI, the starting point is to increase current knowledge in the research field by creating deeper and wider understanding of this data collection work itself, from within the work. For doing this one alternative is to do the "ethnographies of manual collection of IBI".

2. Related ethnographies in manufacturing context

In the literature the ethnographies studying different kind of work goes usually under the headlines of "ethnographic approaches to work" or "ethnographies of work" [13]. This research tradition has used the ethnographic method to dissect how workers do their jobs applying the theories from sociological research (sociology of work), anthropology and cultural stdies. The idea is to go "near to the work itself" as participant observers, both as "real workers" or as "witnesses" [14]. The data then has varieties consisting for instance of observations, in-depth interviews, field surveys, company documents, production records, newsletters, memos and annual reports [15].

Both participant observation and nonparticipant observation have the potential to generate insights based on embeddedness in the setting [16]. Nonparticipant observers may, however, have additional hurdles in being accepted as "one of the gang" since they are not engaged in the activity, and this distinction can have important implications for the quantity and quality of the data collected. Participant observation produces superior results relative to both nonparticipant observation and interviews in terms of both coverage of topics and richness of description [17].

For instance Michael Burawoy´s Manufacturing Consent provides an example of a workplace ethnography based on participant observation [15]. Burawoy conducted his study while employed as a machinist in a machine shop. Related to this research strategy, sociologists and anthropologists have also been "employed" as locomotive repairers [18] and mechanics [19].

Closest to our study area could be located the famous ethnographic study focusing on the problem-solving strategies of copy-machine field technicians [20]. This study created the understanding of the maintenance work "from within", trying to understand what really mattered in this work for technicians, how the problem-solving occurred in the daily-level and why the regulations of maintenance management did not work in the concrete customer situations. Focusing on the coping strategies of these field workers study identified the crucial role of "communities of practice" sharing the customer knowledge by narrating the problem-solving with colleagues as an alternative for formal diagnosing and documentation of customer embedded knowledge. This study highlights also the problems of "documentation" and manually gathered IBI. Since each machine is situated and used differently, technicians find such documentation only partially useful, and not fully credible. As a diagnostic frame, the technicians "tell stories" and combine facts about the machines with the context of a specific situation and the identity of the technician involved. These stories help technicians think clearly, spell out differences in problems, and support the development of diagnostic understanding; they also instruct and/or challenge other technicians, assert membership, and celebrate the heroism of the community [20].

Related to these observations some related studies have brought up the concepts of professional pride or occupational identities when giving answers in understanding maintenance work, also the aspects of documentation and data gathering. For instance, the manual data collection practices might not belong to the space of "craftmen identity" where the dignity and the job satisfaction is deriving from the idea of keeping the plant running and doing the best for the machine. These are the sort of things that give the craftsmen most professional pride, identified as "the craftsman's dignity" [21]. In other words: it might be so that problems related to data collection of these maintenance workers are beyond "skills and procedures" [5]. For instance "not collecting IBI" might be also interpreted as part of "craftsman identity" where the manual data collection procedures might be interpreted as part of "employer control" and then the avoidance or even sabotage could be seen as "a resisting action towards the control" [22] [23]. If so, the without understanding the work "from within" these actions might seem to researcher as bringing insufficient manual data related to IBI. But from "within" these aspects of "avoidance" or even "sabotage" [24][25] make sense and lead the researcher to find alternative, even new ways of manual data collection which would be suitable in the given industrial context.

3. Guidelines for the future research agenda for manually collected IBI

Despite the growing body of research related to practices of maintenance management as such, there still exists a research gap of highlighting the aspects of manually collected IBI as a specific area of modern maintenance work. Against this

background, the present text is proposing that ethnographic research could be one alternative way of adding academic knowledge in the field. In this sense workplace ethnography of maintenance work can lead to new, co- produced theoretical and practical openings related to manual data collection work. Therefore, crucial element of this future research agenda is to study the data collection behavior which consists of various practices and actions of "data collectors". Based on the review of current literature written inside the managerial discourse, there is a need to open up the data collection work as context-related phenomenon having its varieties depending on the industries, their location, histories and embedded cultures. In this study the interest then is then creating deeper and wider understanding of this data collection work in specific contexts, "from within" the data collection work.

In this study the aim is to reach the level of participant observation of data collection work, even if observation alone might already yield a relatively satisfactory level of information about data collection actions and practices. Without participation and going "inside the work" this level of observations could be hard to gain in highly sensitive study settings. In this sense the idea is to continue the previous "ethnographies of work" especially in the maintenance context [20]. This idea is also encouraged in previous research considering that "other theorists to should pick up on Orr's themes and take his ideas into new directions" [26]. In this case the interest is in focusing more on data collection practices instead of the repair work which could be located to the traditional area of corrective maintenance [3].

When analyzing the manual data collection of IBI "from within" the ethnographic researcher should be open to alternative theoretical explanations of "data collection challenges" and utilize the information gathered from the previous workplace studies [24][25]. Besides previous ethnographies new theoretical concepts could be aligned to understand the new occupational identities, identity shifts and various demands related to that beyond the competence and skills development programs and procedures. And these identities and their shifts should be understood as contextual and culturally embedded processes. Therefore the crucial element in this research agenda is to look for a variety (for instance different countries and industrial branches) to bring up the variety, or the "qualities" in front confronting the current maintenance management paradigm of the universal and non-contextual knowledge.

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